



SECTION 4

Project Description

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4 PROJECT DESCRIPTION

4.1 OVERVIEW

The Project includes extraction of a new underground mining area (known as Area 5) to gain access to additional coal within CCL 768 (Figure 1-1).

The Project would be supported by the development of surface infrastructure and an extension to the life of the existing surface operations of the Dendrobium Mine (namely the Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Kemira Valley Rail Line, Dendrobium CPP, Dendrobium Shafts [i.e. No 1 Shaft and No 2 and 3 Shafts] and the West Cliff Stage 3 Coal Wash Emplacement Area).

The Project would provide continued employment for the existing Dendrobium Mine workforce of approximately 650 personnel as well as an additional 50 operational personnel, and up to approximately 100 construction personnel for the Project.

The Project proposes to extend the mine life at the Dendrobium Mine to 31 December 2041. This would include extending underground mining operations into a new underground mining area (known as Area 5) until approximately 2035 (noting this may change depending on mine sequence), as well as extending the life of the existing Dendrobium Mine surface facilities to 2041 to facilitate receipt of ROM coal from Area 3C.

The Project mine life extension would allow the potential for the receipt of ROM coal from the Appin Mine at the Dendrobium CPP, if required, to continue to the end of the currently approved Appin Mine life under Project Approval 08_0150 (i.e. 2041).

The Project would include the following activities:

- longwall mining of the Bulli Seam in a new underground mining area (Area 5);
- development of underground roadways from existing Dendrobium Mine underground areas (namely Area 3) to Area 5;
- use of existing Dendrobium Mine underground roadways and drifts for personnel and materials access, ventilation, dewatering and other ancillary activities related to Area 5;
- development of new surface infrastructure associated with mine ventilation and gas management and abatement, water management and other ancillary infrastructure;
- handling and processing of up to 5.2 Mtpa of ROM coal (no change from the approved Dendrobium Mine);
- extension of underground mining operations within Area 5 until approximately 2035;
- continued use of the existing Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Dendrobium CPP and Dendrobium Shafts with minor upgrades and extensions until approximately 2041;
- transport of ROM coal from the Kemira Valley Coal Loading Facility to the Dendrobium CPP via the Kemira Valley Rail Line;
- handling and processing of coal from the Dendrobium Mine (including the Project) and IMC's Appin Mine (if required) to the Dendrobium CPP to 2041;
- delivery of coal from the Dendrobium CPP to Port Kembla for domestic use at the Port Kembla Steelworks and Liberty Primary Steel Whyalla Steelworks or export through the PKCT;
- transport of coal wash by road to customers for engineering purposes (e.g. civil construction fill), for other beneficial uses and/or for emplacement at the West Cliff Stage 3 and/or Stage 4 Coal Wash Emplacement Area;
- development and rehabilitation of the West Cliff Stage 3 Coal Wash Emplacement Area (noting that opportunities for beneficial use of coal wash would be maximised);
- continued use of the Cordeaux Pit Top for mining support activities such as exploration, environmental monitoring, survey, rehabilitation, administration and other ancillary activities;
- progressive development of sumps, pumps, pipelines, water storages and other water management infrastructure;
- controlled release of excess water (similar to the current regime in the EPL 3241) and/or beneficial use;
- monitoring, rehabilitation and remediation of subsidence and other mining effects; and
- other associated infrastructure, plant, equipment and activities.

An indicative Project general arrangement showing the underground mining area is provided on Figure 1-3.

The Project does not include longwall mining (i.e. secondary extraction) within approved underground mining Areas 1, 2, 3A, 3B and 3C. These activities will continue to operate in accordance with Development Consent DA 60-03-2001 (as modified).

Table 4-1 provides a summary of the key characteristics of the Project.

4.2 PROJECT AREA

4.2.1 Site Location

The Project is located in the Southern Coalfield of NSW, approximately 8 km west of Wollongong (Figure 1-1).

The Project is located in the Wollongong, Wingecarribee and Wollondilly LGAs (Figure 1-1).

The Project underground mining area is located within the Avon and Cordeaux catchments, including the catchment of the Avon Dam. These catchments are within the Metropolitan Special Area declared under the *Water NSW Act 2014*. The Project underground mining area would not directly mine beneath the FSL (i.e. maximum operating water level) of the Avon Dam or Cordeaux Dam.

Mining within the Metropolitan Special Area has occurred for more than 100 years, including longwall mining for the existing Dendrobium Mine, which is approved until 2030.

The Project underground mining area is situated on the Woronora Plateau, which includes the upper catchments of the Cataract River and Nepean River. The Woronora Plateau is characterised by incised watercourses that have formed steep blocky valleys and cliff lines that contain sandstone overhangs. Open sections of exposed sandstone occur along ridge tops and plateau caps.

Original vegetation remains over most of the Project underground mining area, except for the presence of fire trails, powerlines, the unused Maldon-Dombarton rail corridor and other minor disturbances.

The Dendrobium Pit Top and Kemira Valley Coal Loading Facility are located adjacent to Mt Kembla village, approximately 8 km west of Wollongong on the Illawarra Escarpment. The Kemira Valley Rail Line runs from the Kemira Valley Coal Loading Facility to the Dendrobium CPP, which is located within the Port Kembla Steelworks precinct.

The existing access and material drifts (Dendrobium tunnel and Kemira tunnel) for the Dendrobium Mine pass beneath a portion of the Illawarra Escarpment State Conservation Area to existing underground mining areas. However, within the Infrastructure Application Area, the Illawarra Escarpment State Conservation Area is restricted to a depth of 15.24 m.

The Infrastructure Application Area for the Project also includes a portion of the Upper Nepean State Conservation Area; however, these portions are restricted to a depth of 50 m.

The Infrastructure Application Area includes those lands listed in the real property description provided in support of the Infrastructure Application (Attachment 3). A description of land zoning in the Project Infrastructure Application Area under the relevant LEPs for each LGA is provided in Attachment 7.

Relevant land ownership information for land parcels within the immediate vicinity of the Project is provided in Attachment 4.

4.2.2 Tenure

The Project underground mining area would be located wholly within CCL 768. No additional mining tenements are required for the proposed underground mining associated with the Project.

Similarly, no additional mining tenements are required for the continued use of the Dendrobium Mine surface facilities for the Project.

4.2.3 Coal Resource, Geological Features and Exploration Activities

The Project would extract the Bulli Seam in the Late Permian Illawarra Coal Measures (Figure 4-1).

The Dendrobium Mine currently extracts coal from the Wongawilli Seam. The Appin Mine (also owned and operated by IMC) currently extracts coal from the Bulli Seam.

	INDICATIVE THICKNESS (m)	FORMATION	GROUP
	170	Hawkesbury Sandstone	HAWKESBURY SANDSTONE
	15	Newport Formation	NARRABEEN
	5	Garie Formation	
	20	Bald Hill Claystone	
	170	Colo Vale Sandstone	
	40	Wombara Formation	ILLAWARRA COAL MEASURES
	2.5	Bulli Seam	
	20	Eckersley Formation	
	9	Wongawilli Seam	
	10	Kembla Sandstone	

Table 4-1
Summary of Key Project Characteristics

Component	Project
Project Area	Refer to Attachment 3 (Infrastructure Application Area and Real Property Descriptions).
Mine Life	Until 31 December 2041 ¹ .
Mining Method	Underground extraction using longwall mining methods.
Resource	Mining of approximately 31 Mt of additional ROM coal within the Bulli Seam in Area 5 within CCL 768.
Annual Production	Handling and processing of up to 5.2 Mtpa of ROM coal.
Coal Handling and Processing	<p>Transport of coal from underground workings to the Kemira Valley Coal Loading Facility via an underground conveyor network.</p> <p>Continued sizing and stockpiling of coal at the Kemira Valley Coal Loading Facility prior to transport to the Dendrobium CPP via the Kemira Valley Rail Line, in accordance with the approved hours of operation (section 4.7).</p> <p>Continued processing of up to 5.2 Mtpa of sized ROM coal at the Dendrobium CPP.</p>
Management of Mining Waste	<p>Transportation of up to approximately 1 Mtpa of coal wash by road from the Dendrobium CPP to the West Cliff Stage 3 and Stage 4² Coal Wash Emplacement Area (Section 4.8).</p> <p>Continued development and rehabilitation of the West Cliff Stage 3 Coal Wash Emplacement Area.</p> <p>Continued supply of coal wash to customers for engineering purposes (e.g. civil construction fill) or for other circular economy opportunities (e.g. beneficial uses).</p>
General Infrastructure	<p>Continued use of Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Kemira Valley Rail Line, Dendrobium CPP and Dendrobium No 1 Shaft and No 2 and 3 Shafts with minor upgrades and extensions (Section 4.4).</p> <p>Development of new surface infrastructure associated with mine ventilation and gas management and abatement (Shaft Site No. 5A), and other ancillary infrastructure (including ETL to proposed mine ventilation infrastructure) and minor fire trail upgrades (Sections 4.4 and 4.5).</p> <p>Development of additional carpark facilities.</p>
Surface Disturbance Area	Project surface disturbance area of approximately 30 ha associated with the proposed surface facilities, impacting up to approximately 20 ha of native vegetation.
Product Transport	Continued delivery of product coal from the Dendrobium CPP to the BlueScope Port Kembla Steelworks or to PKCT for transport to Liberty Primary Steel Whyalla Steelworks or for export (Section 4.7).
Water Management	<p>Augmentations and extensions to existing water management infrastructure as required (Section 4.9).</p> <p>Continued use of a combination of recycled treated mine water and potable water purchased from Sydney Water in underground and surface operations. Continued release of water in accordance with the conditions of EPL 3241.</p> <p>Development of temporary water supply infrastructure for construction water supply for Shaft Site No. 5A.</p> <p>Provision of offsets (funding of "indirect" offsets) for predicted surface water take as a result of the Project that would result in a net gain to Metropolitan water supplies.</p>
Workforce	<p>At full development, the Project would employ in the order of 700 operational personnel (650 existing workforce, additional 50 workforce for the Project at full development) (Section 4.14).</p> <p>Up to approximately 100 personnel would also be required for construction and development activities.</p>
Hours of Operation	<p>Operations</p> <p>Operations to occur on a continuous basis, 24 hours per day, seven days per week (Section 4.14.2).</p> <p>Trains do not travel on the Kemira Valley Rail Line between 11:00 pm and 6:00 am unless written approval is obtained from the EPA for emergency use of the rail line.</p> <p>Stockpile management at the Kemira Valley Coal Loading Facility (using bulldozer or loader) between 7:00 am and 10:00 pm (Section 4.6.1).</p> <p>Construction</p> <p>Construction to generally occur during standard construction hours (i.e. Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays and Public Holidays) (Section 4.3).</p> <p>Some construction and development works to occur on a 24-hour basis (e.g. ventilation shaft site).</p>

Table 4-1
Summary of Key Project Characteristics (Continued)

Component	Project
Capital Investment Value	\$853 million.

¹ Area 5 longwall extraction to approximately 2035. Use of surface infrastructure that forms part of the Project proposed to continue until 2041 to allow receipt of coal mined in approved Area 3C, and the potential for receipt of Appin Mine coal (if required) to the end of the currently approved Appin Mine life under Project Approval 08_0150.

² Development and rehabilitation of the West Cliff Coal Wash Emplacement Area would continue to be conducted in accordance with Project Approval 08_0150 for the Appin Mine.

Further information on the characteristics of the coal resource, geological features and previous and proposed exploration activities are provided below.

Geology

The Project is located in the NSW Southern Coalfield within the southern portion of the Permo-Triassic Sydney Basin.

The Late Permian Illawarra Coal Measures contain a number of workable seams in the Southern Coalfield. Above the Illawarra Coal Measures, the stratigraphy consists of a sequence of sandstone, shale and claystone units within the Narrabeen Group which are, in turn, overlain by the Hawkesbury Sandstone.

A typical stratigraphic section of the Project area is shown on Figure 4-1.

Although the Dendrobium Mine currently extracts coal from the Wongawilli Seam in the approved Area 3, in Area 5 this seam has been subject to igneous intrusions over the majority of the area, and is, therefore, not currently viable for extraction.

Mineable areas of the Bulli Seam have been identified in the Project underground mining area. A summary of the characteristics of the target seam in the vicinity of the Project is provided in Table 4-2.

Table 4-2
Characteristics of the Target Coal Seam in the Project Area

Seam	Depth of Cover (m)	Seam Thickness (m)
Bulli Seam	250 – 400	2.1 – 3.2

m – metres.

The coal seams have a regional dip to the north of about 1 in 50.

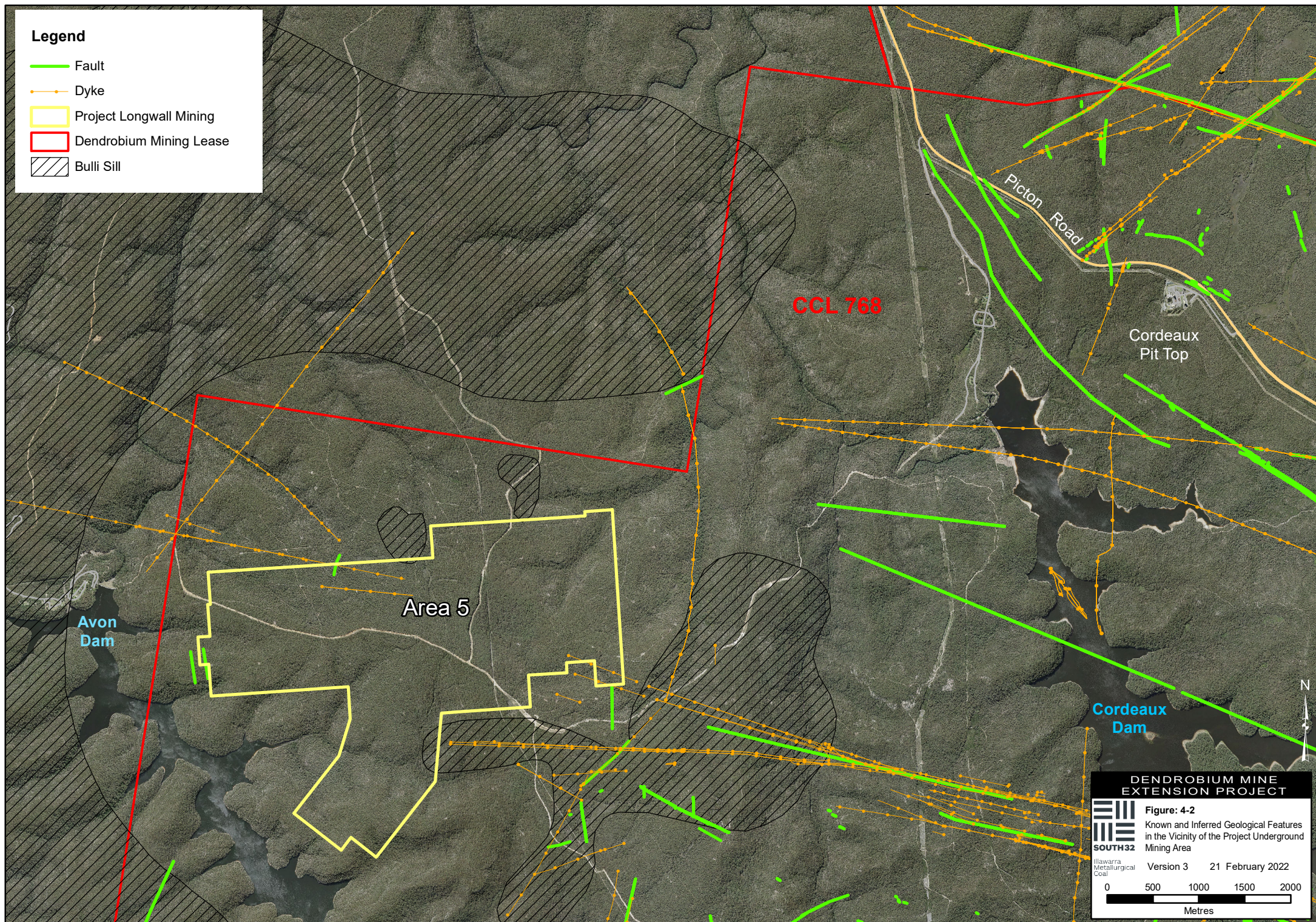
The Bulli Seam is the uppermost seam of the Illawarra Coal Measures (Department of Mineral Resources, 2000). The Project would extract a cutting height of an average of approximately 2.8 m (maximum 3.2 m). The seam floor consists of mudstone and carbonaceous mudstone. The Bulli Seam predominantly produces a metallurgical coal.

A small portion of the Project area is affected by igneous intrusions in proximity to the Bulli Seam. These portions are termed “heat affected” and produce a thermal or pulverised coal injection (PCI) product. The Project mine plan would target areas that would predominantly yield the highest quality metallurgical coal resource, leaving the majority of thermal or PCI product unmined.

Known and inferred geological features in the vicinity of the Project underground mining area are shown on Figure 4-2.

Legend

- Fault
- Dyke
- Project Longwall Mining
- Dendrobium Mining Lease
- Bulli Sill



A large syncline runs to the east of Area 5, plunging to the north. Several north-south trending lineaments are also present in the vicinity of the Project underground mining area, including the Narellan, Cordeaux River and Avon River Lineaments.

Igneous intrusions have been detected in the Bulli Seam by seismic assessment and exploration drilling. The eastern extent of Area 5 is defined by a large area of intrusion in the Bulli Seam. The intrusions are altered, moderately hard and vary in thickness from 1 to 3 m. Other smaller-scale (low confidence and/or low displacement) features have been suggested from high-level survey techniques (e.g. seismic, aeromagnetic, geophysical interpretations, etc.) and would be investigated further as mining progresses. IMC continues to develop a geological model across the Project area that is progressively updated with the most recent and reliable data.

Exploration

The exploration program to support the Project is a continuation of that undertaken at the Dendrobium Mine to refine details of seam quality, gas levels, geotechnical constraints and the locations of major geological structures and igneous intrusions.

Mine exploration activities would continue during the life of the Project. These activities would investigate geological structures, seam gas content and composition, and seam morphology as input to detailed mine planning and engineering studies. This data, in combination with surface exploration and underground mapping data would be used to build robust geological models upon which detailed mine plans for the Project can be developed.

Surface exploration activities would generally require only small surface areas and would involve the use of surface drilling rigs and supporting equipment, low-impact seismic acquisition, surface mapping and airborne and ground-based geophysical surveys. Surface exploration activities would be progressively rehabilitated over the life of the Project.

In addition to surface-based exploration, in-seam drilling would be undertaken in advance of mining to identify minor geological structures and, where required, drain the gas from the coal seam (and adjacent strata).

In-seam drilling has been undertaken since the 1970s to prevent outbursts (gas-driven ejection of coal from the active mining face), which have historically caused fatalities in the Southern Coalfield.

Exploration activities meeting the definition of “prospecting” under the NSW *Mining Act 1992* do not form part of the Project. Separate assessment of exploration activities would be undertaken pursuant to Part 5 of the EP&A Act.

Coal Resource

The Project seeks the extraction of approximately 31 Mt of ROM coal from Area 5 over the life of the Project from CCL 768.

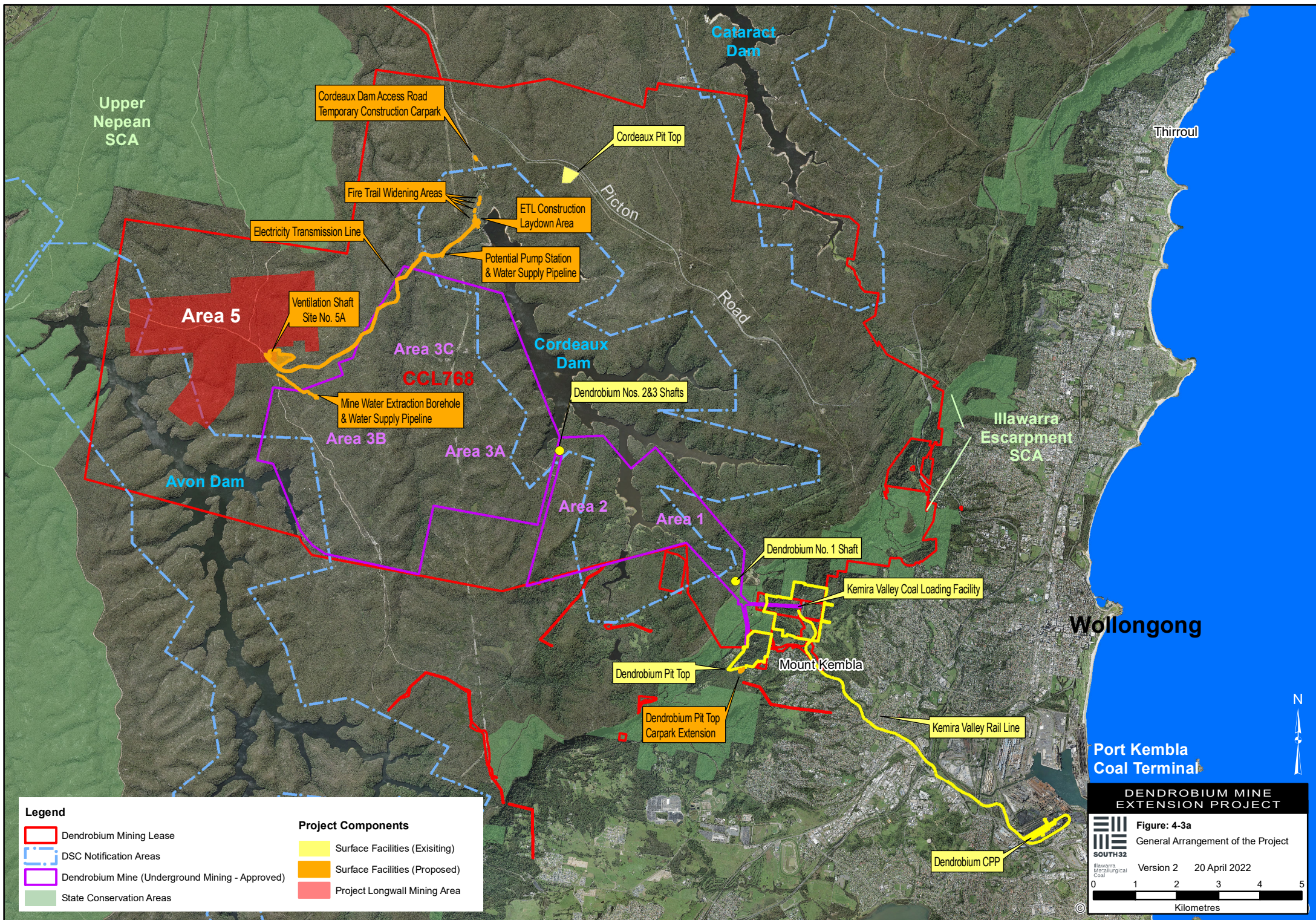
IMC’s Financial Year 2021 Coal Resource and Reserve Statement for the Project and approved Dendrobium Mine is provided in Attachment 15. Resource recovery for the Project is constrained by geological, environmental and infrastructure features (Section 4.5.2).

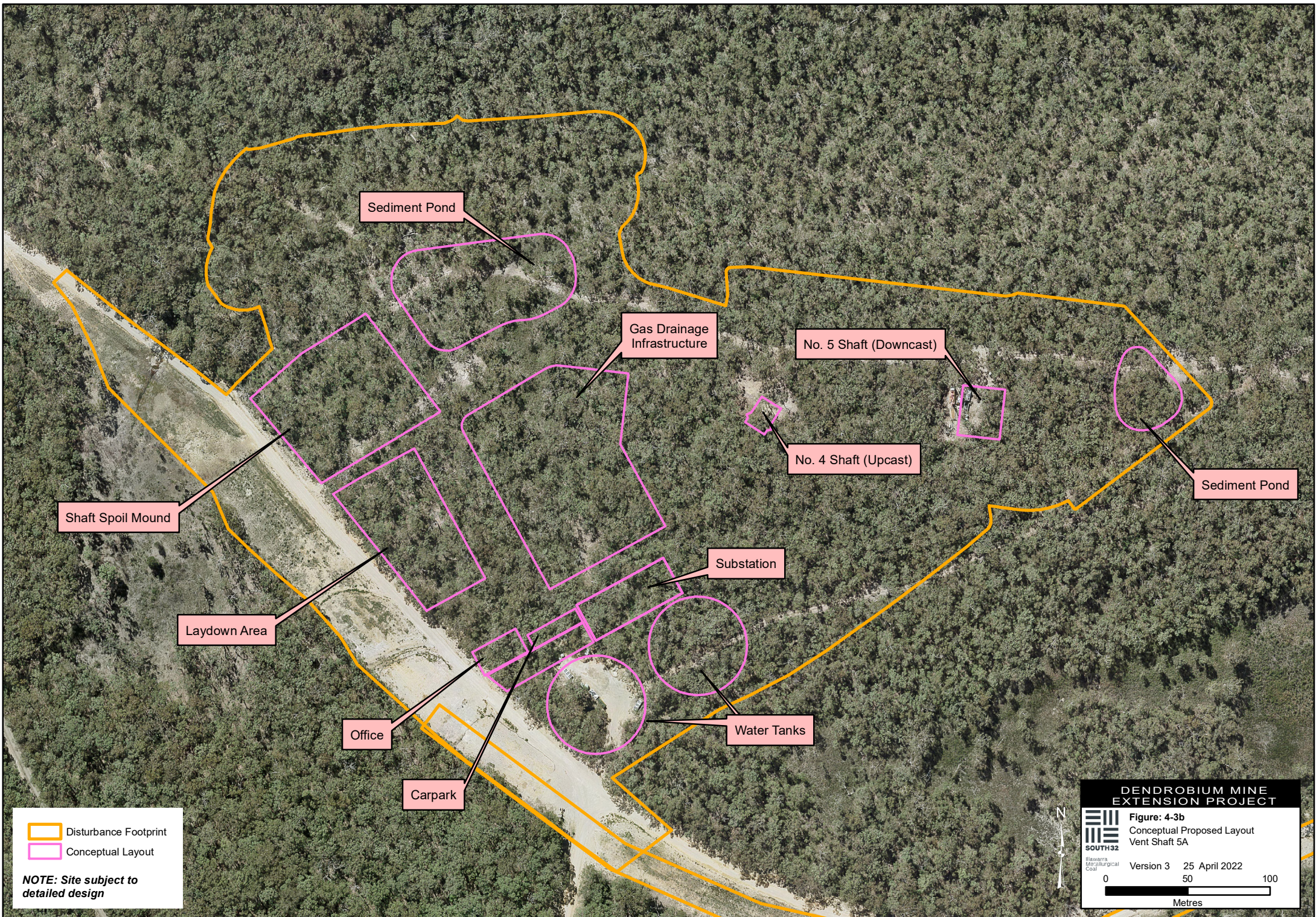
There is a low level of geological confidence associated with Inferred Resources and there is no certainty that further exploration work will result in the determination of Indicated Mineral Resources or that the production target will be realised. Further evaluation work and appropriate studies are required to establish sufficient confidence that this target will be met.

4.3 PROJECT SCHEDULE

An indicative Project general arrangement showing the underground mining area and proposed surface infrastructure is provided on Figures 4-3a to 4-3f.


An indicative Project schedule is provided in Figure 4-4.







Cordeaux Dam Access Road
Temporary Construction Carpark

 Disturbance Footprint

**NOTE: Site subject to
detailed design**

**DENDROBIUM MINE
EXTENSION PROJECT**



Figure: 4-3c
Conceptual Proposed Layout
Cordeaux Dam Access Road
Temporary Construction Carpark

Version 1 25 April 2022

0 10 20 30 40


Metres



Insert A



See insert A

Conceptual Layout (Waterpipe)
Disturbance Footprint

NOTE: Site subject to detailed design

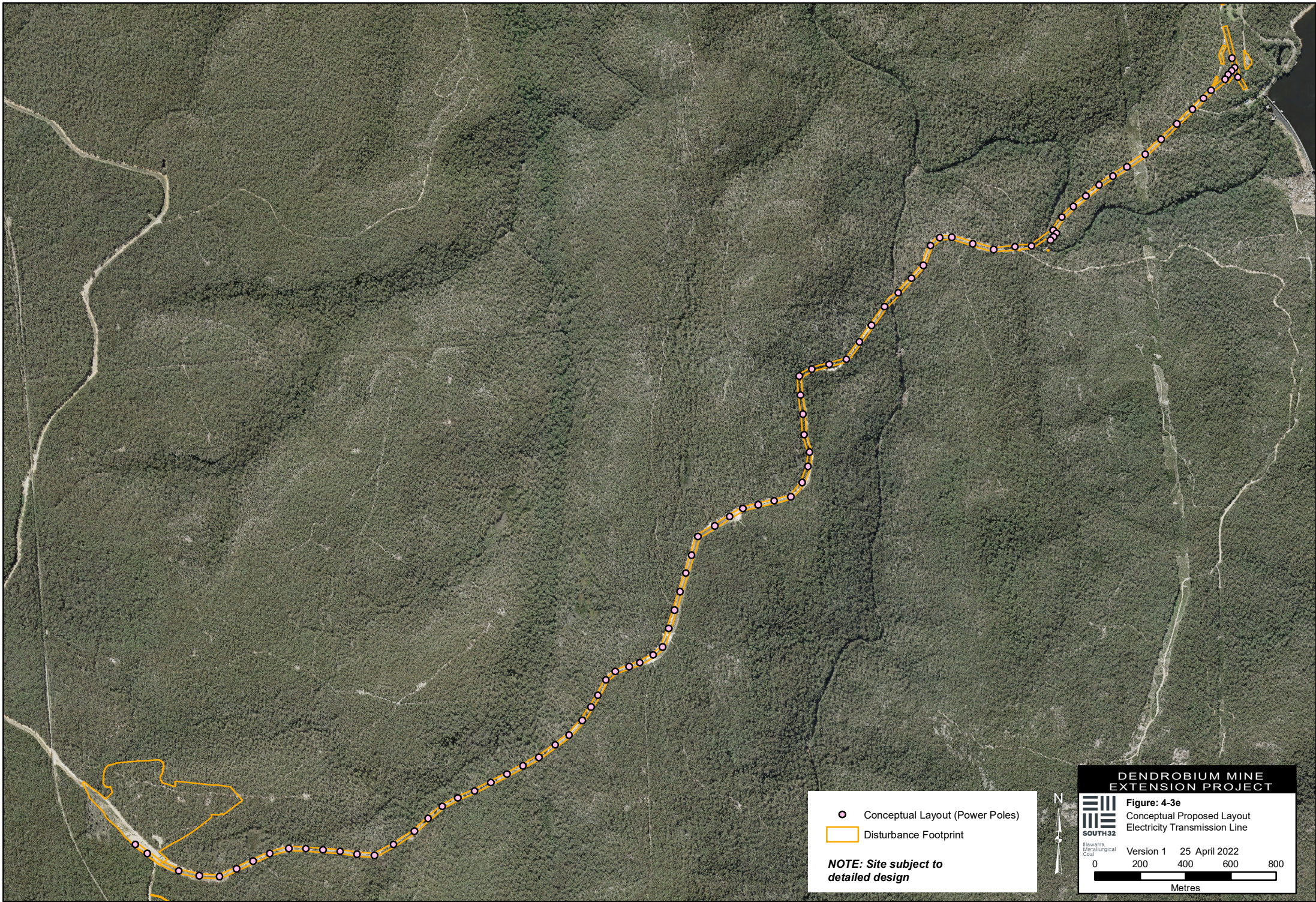


**DENDROBIUM MINE
EXTENSION PROJECT**

Figure: 4-3d
Conceptual Proposed Layout
Pump Station and Water Supply Pipeline

Version 1 25 April 2022

0 100 200 300 400
Metres





Component	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Construction Activities																				
Dendrobium Pit Top Upgrades*																				
Ventilation Shaft Construction and Development																				
Shaft Site No 5A																				
Operational Activities																				
Approved Underground Mining Under DA 60-03-2001																				
Area 3 - Development and Longwall Mining**																				
Project Underground Mining																				
Area 5 - Development																				
Area 5 - Longwall Mining																				
Surface Facilities																				
Shaft Nos 1, 2 and 3																				
Shaft No 5A																				
Dendrobium Pit Top																				
Kemira Valley Coal Loading Facility																				
Kemira Valley Rail Line																				
Dendrobium CPP																				
Cordeaux Pit Top																				
Coal Wash Emplacement and Alternate Use																				
Stage 3 Coal Wash Emplacement																				
Stage 4 Coal Wash Emplacement***																				
Alternate Use of Coal Wash																				

Currently Approved Life of the Mine (DA 60-03-2001)

* The construction timeframes specified (i.e. 1 year) represent a likely construction window, with the majority of construction activities occurring intermittently within this period

** Subject to separate assessment and approval of an extension of Development Consent DA 60-03-2001 from 31 December 2030 to 31 December 2040

*** Subject to separate Project Approval 08_0150 up to 31 December 2041

Figure 4-4 - Indicative Project Schedule

4.4 PROJECT CONSTRUCTION AND OTHER DEVELOPMENT ACTIVITIES

The Project would use existing pit tops and supporting infrastructure. Additional infrastructure and upgrades to existing infrastructure that are required to support the Project would be progressively developed in parallel with ongoing mining operations, including:

- development of underground roadways, coal clearance infrastructure and other ancillary infrastructure required to access and support the Project underground mining area;
- underground mining machinery replacement and upgrades;
- development and augmentation of mine ventilation infrastructure;
- additional gas management and abatement infrastructure;
- upgrades to the Dendrobium Pit Top and decommissioning and removal of redundant infrastructure;
- ongoing maintenance and upgrades of the Kemira Valley Rail Line and water management infrastructure;
- upgrades and replacement of infrastructure at the Dendrobium CPP and removal of redundant infrastructure;
- development of additional electricity supply infrastructure;
- development of additional water supply infrastructure;
- development of additional carparking facilities; and
- minor augmentations and upgrades of other surface facilities.

Construction would generally occur during standard construction hours (i.e. Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays or public holidays). Some construction and development works (e.g. drilling and construction of the ventilation shaft, and underground development activities) would occur on a 24-hour per day basis.

Additional mobile equipment would be required for periods during the Project construction and development activities including drill rigs, mobile cranes, excavators, loaders and delivery trucks. The numbers and types of equipment would vary depending on the construction development activity being undertaken.

Noise mitigation and management measures are described in Sections 7.13 to 7.15 and Appendix J of the EIS.

4.4.1 Development of Access and Supporting Infrastructure for Underground Mining Areas

Underground roadways would be developed to access and support the Project underground mining area (i.e. for access, ventilation and coal clearance).

Coal clearance infrastructure and other ancillary infrastructure would be developed for the Project underground mining area.

Existing coal clearance infrastructure would also be upgraded and augmented progressively throughout the life of the Project through replacement or upgrades of conveyors, sizers, drives, winders and supporting systems.

Other ancillary infrastructure required to support the Project underground mining area includes infrastructure for electricity distribution, communication systems, water management, services and service delivery (e.g. boreholes to the surface) which would be within the approved disturbance footprint.

Further detail regarding underground mine access and development works is provided in Section 4.5.4.

4.4.2 Underground Mining Machinery Replacement and Upgrades

Over the life of the Project, it is anticipated that a range of underground mining equipment would be replaced or upgraded as a component of general maintenance, or to increase efficiency (Section 4.5.5).

4.4.3 Mine Ventilation Infrastructure

The Project would involve the development of an additional ventilation shaft site (Shaft Site No. 5A) to support Area 5 where two new shafts (No. 4 and No. 5 Shafts) are proposed to be constructed (disturbance of approximately 15 ha) (Figure 4-3a).

Construction of the Shaft Site No. 5A for the Project would involve:

- improvement of existing fire trails and construction of new tracks to allow access (where necessary);
- development of two composite concrete-steel-lined or steel-lined shafts (one upcast and one downcast);
- installation of ventilation fan(s) and associated power supply for the ventilation shafts;
- installation of a power supply and transmission line and associated electrical switchroom, transformer and ancillary infrastructure for the ventilation fan;
- construction of service boreholes for services such as gas drainage, gas monitoring, site dewatering and compressed air;
- installation of appropriate security fencing to prevent unauthorised access to the ventilation shaft site;
- construction of process ponds/sumps for the containment of drilling process water (pending its disposal underground or off-site);
- installation of permanent erosion and sediment control infrastructure, where required;
- installation of an access/egress winder or winder pad at the ventilation shaft site to facilitate emergency transportation to/from underground mining operations; and
- other minor associated works (e.g. installation of temporary erosion and sediment control infrastructure, where required, installation of temporary demountable buildings for staff, minor Fire Trail upgrades as required to support construction traffic and maintain safe and serviceable access).

It is expected the shafts would be constructed from the surface down using either the blind bore or blind sink method to the underground workings and would take approximately 2 to 3 years to construct.

The shafts construction would take place in advance of development workings, with material from the excavation being removed from the top of the shafts. The concept construction footprint is shown on Figure 4-3a and detailed designs would be prepared in consultation with WaterNSW.

It is proposed to use the excavated material resulting from the construction of the shafts as engineered fill and for construction of sediment dams. Any excess material is proposed to be stockpiled on-site, revegetated and used for future rehabilitation of the shaft site upon decommissioning.

Excavation of the shafts would occur 24 hours per day, seven days per week, while the remainder of construction activities associated with the ventilation shafts (e.g. installation of surface infrastructure) would generally be limited to daytime hours.

Ventilation fans, electrical infrastructure and other infrastructure at the existing Dendrobium Shafts may be upgraded or replaced during the life of the Project.

Further detail regarding ventilation infrastructure is provided in Section 4.5.6.

4.4.4 Gas Management and Abatement Infrastructure

Gas management and abatement infrastructure would be developed as described in Section 4.5.7.

Gas from the Project mining area would either be conveyed via an underground piping system to a gas drainage plant located at the No 2 and 3 Shafts (which would be subject to separate assessment and approval under DA 60-03-2001) or alternatively at gas management infrastructure that would be constructed at Shaft Site No. 5A, or released via mine ventilation infrastructure.

Gas management infrastructure would be fully fenced, and may include flares, pumps, nitrogen tanks, gas monitoring, water collection, surface pipes and other ancillary infrastructure.

Gas captured from the Project mining area would be flared or, if the gas was too low in methane (CH₄) content for flaring (or other operational reasons), vented to the atmosphere.

Further detail regarding gas management and abatement infrastructure is provided in Section 4.5.7.

4.4.5 Dendrobium Pit Top

Upgrades at the Dendrobium Pit Top (Figure 4-5) would include:

- construction of additional carparking facilities on the southern side of Cordeaux Road, including an additional intersection with Cordeaux Road;
- extension and/or redevelopment of existing offices, stores, bathhouse and/or office buildings, where required;
- construction of additional demountable offices, buildings, bathhouses and/or support facility buildings, where required; and
- additional electricity distribution infrastructure.

Other minor upgrades and augmentations (e.g. minor maintenance works, installation of erosion and sediment controls, where required) would occur within the current disturbance footprint.

IMC would engage with the Mount Kembla community regarding proposed upgrades at the Dendrobium Pit Top as part of the Project.

Existing infrastructure at the Dendrobium Pit Top that is no longer required may be decommissioned and removed (e.g. demountable buildings).

Upgrades at the Dendrobium Pit Top would be undertaken in accordance with a Conservation Management Plan (CMP), which would be prepared for the site.

4.4.6 Cordeaux Pit Top

Existing infrastructure at the Cordeaux Pit Top that is no longer required may be decommissioned and removed as part of the Project.

Other minor upgrades and augmentations (e.g. minor maintenance works, installation of erosion and sediment controls, minor Fire Trail upgrades, as required, to support construction traffic and maintain safe and serviceable access) would occur within the existing surface lease area and current disturbance footprint (Figure 4-6).

4.4.7 Kemira Valley Rail Line

Additional water management and ancillary infrastructure may be installed within the Kemira Valley Rail Line easement.

Components of the Kemira Valley Rail Line would be replaced, upgraded or augmented during the life of the Project, including track work, culverts, crossings, signalling, fencing and screening, as required.

4.4.8 Kemira Valley Coal Loading Facility

Upgrades to other supporting facilities such as the Kemira Valley Coal Loading Facility during the life of the Project would be within the current disturbance footprint and would involve replacement, upgrade or addition of existing components, for example site amenities, offices, electrical infrastructure, tanks and bins, as required (Figure 4-7).

4.4.9 Dendrobium CPP

A new conveyor from the Dendrobium CPP to the washed coal stockpile would be developed during the life of the Project (Figure 4-8).

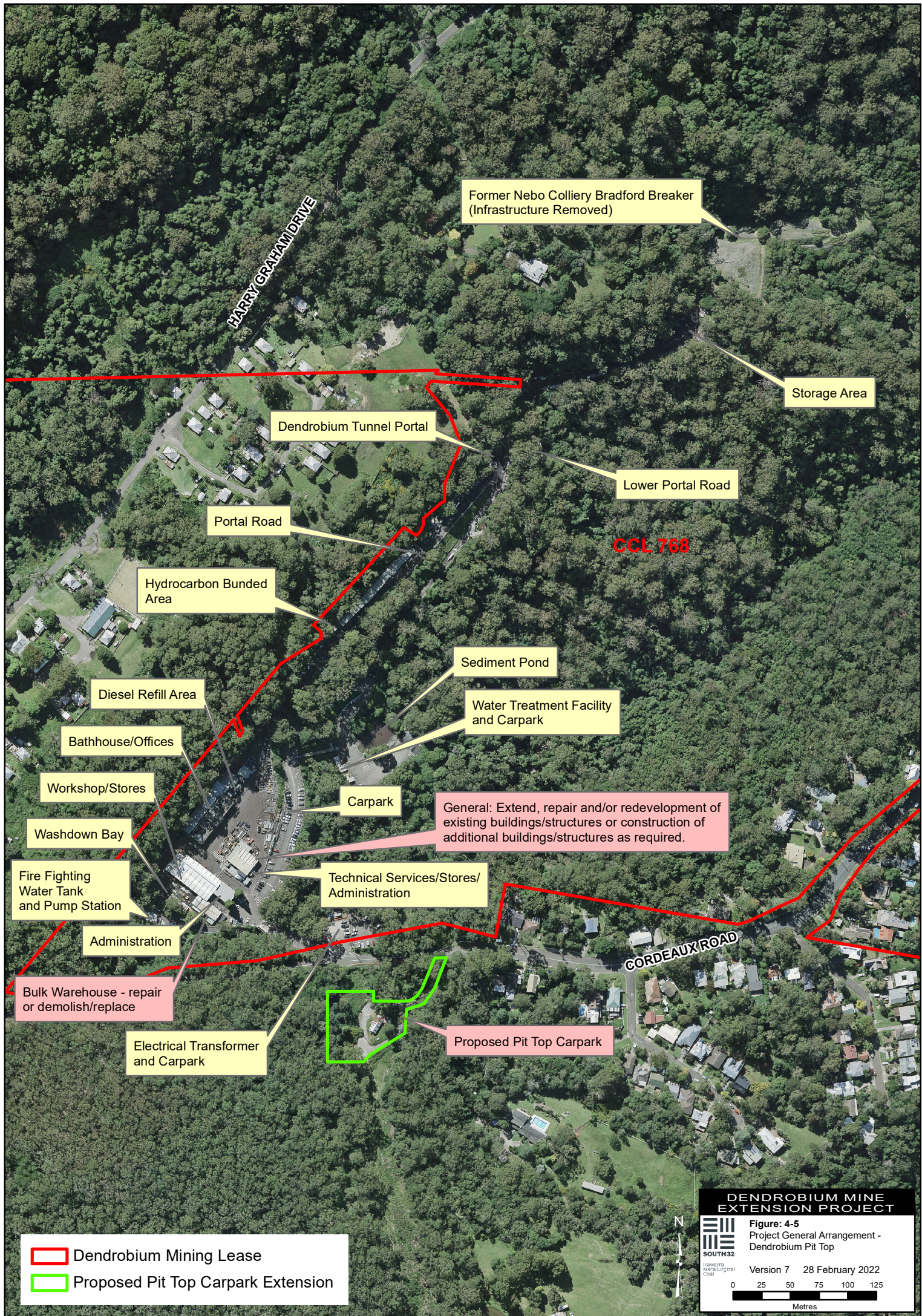
Existing components of the Dendrobium CPP would be replaced, upgraded or augmented during the life of the Project, including, but not necessarily limited to, conveyors, surge bins, storage bins, tanks, sumps, filters, centrifuges, thickeners, chutes, skirts, scrapers, sprays and electrical infrastructure, as required.

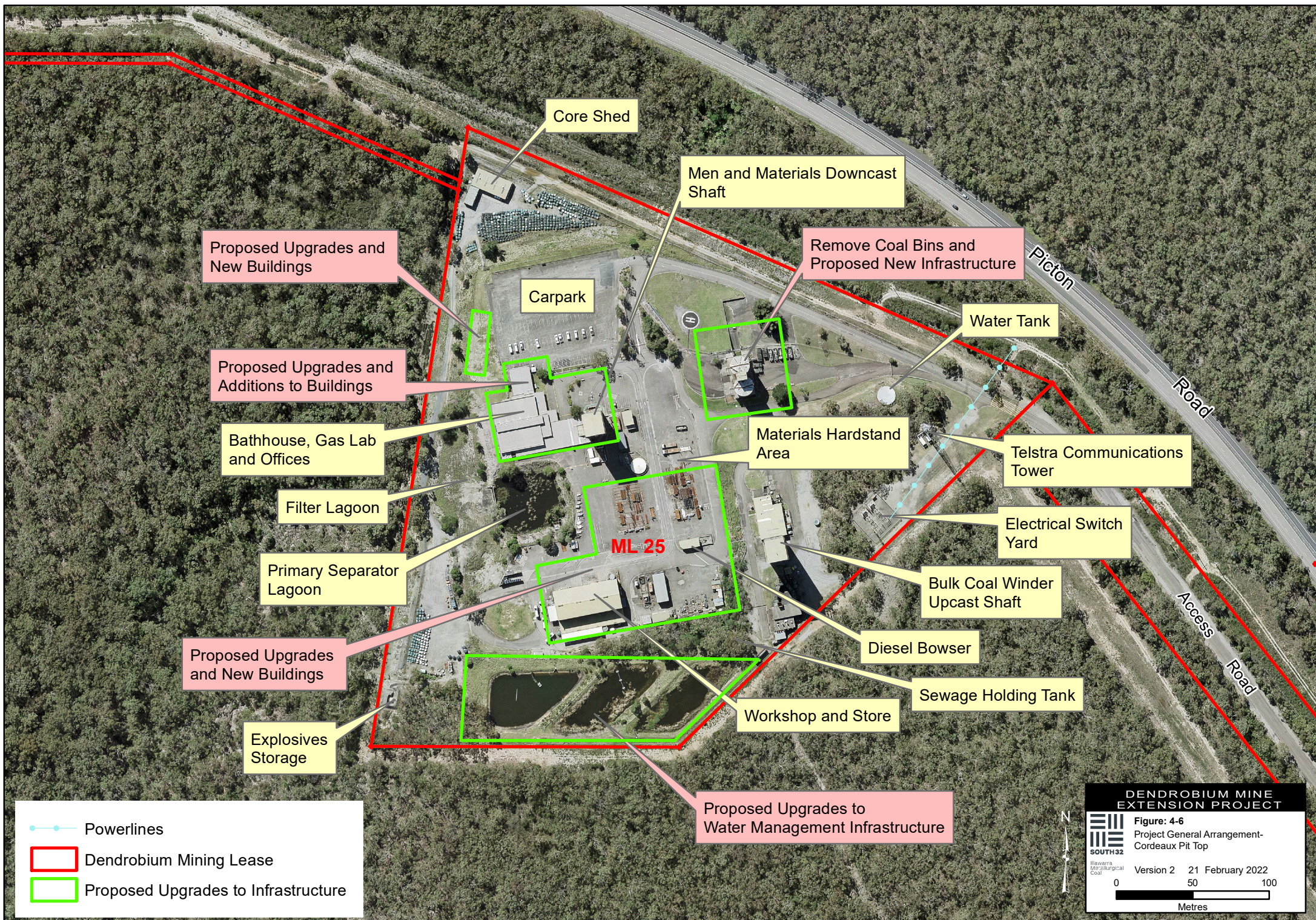
Existing infrastructure at the Dendrobium CPP that is no longer required (e.g. coal bins that are no longer in use) may be decommissioned and removed.

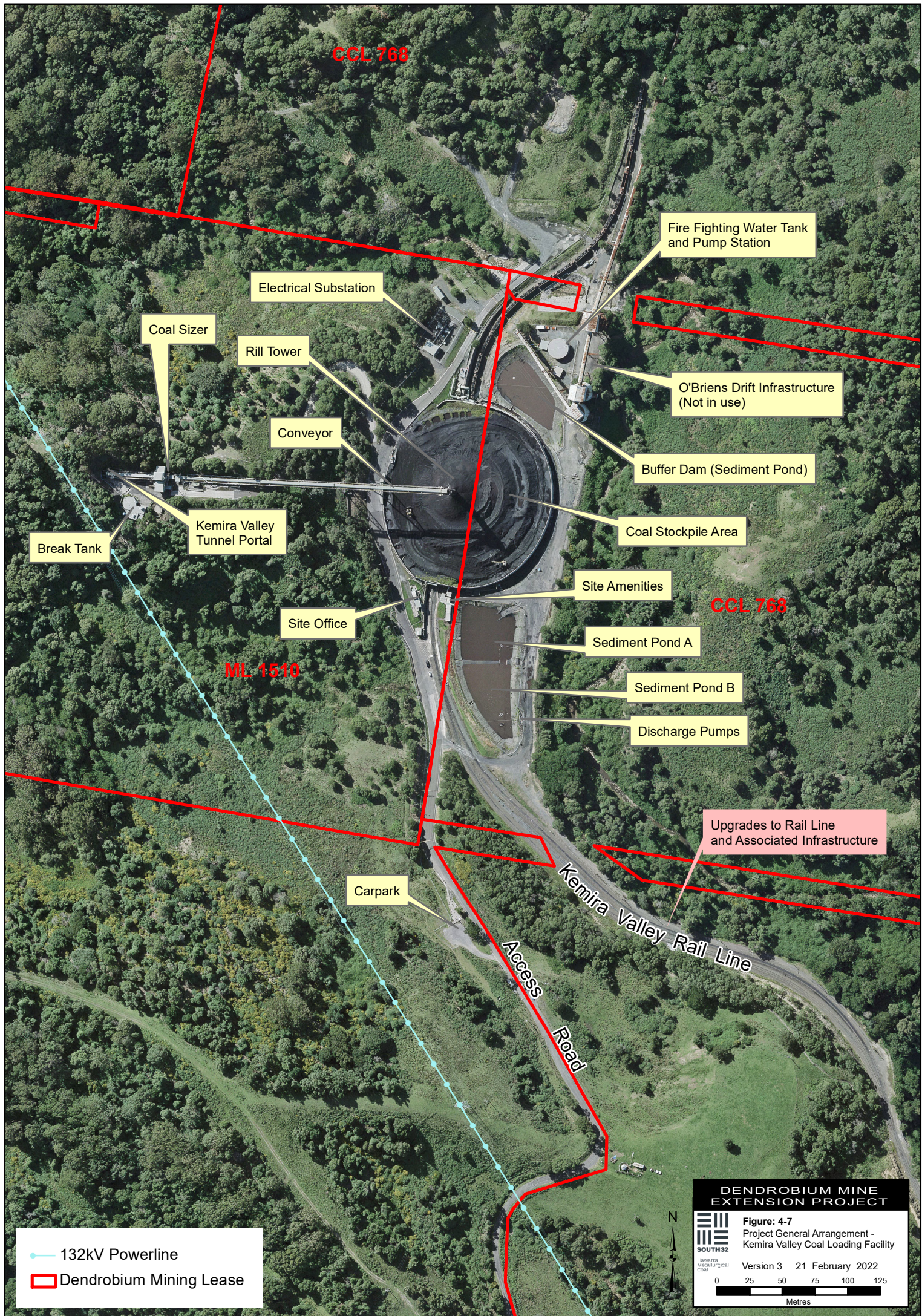
4.4.10 Water Management System Upgrades

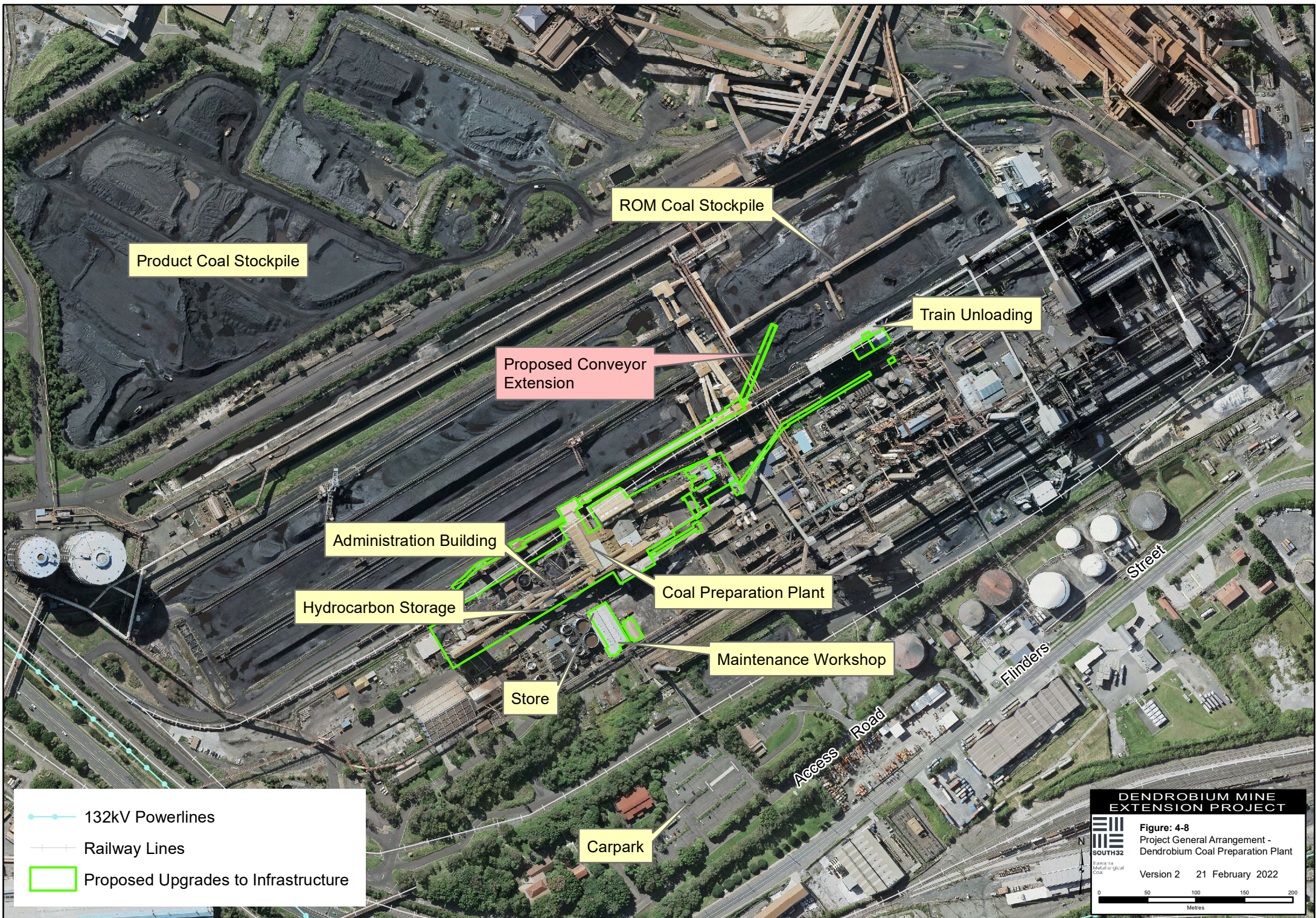
Project water management studies indicate that the expansion of the Dendrobium Mine would be accompanied by increasing groundwater inflows, expected to be negligible at the catchment scale (Appendices B and C), which would increase the volume of water to be transferred off-site for disposal and/or beneficial use. This may require augmentation or duplication of some water management infrastructure to accommodate increased mine inflows.

In particular, the existing mine water discharge pipeline that follows the Kemira Valley Rail Line to the licensed discharge point at Allans Creek, Unanderra (LDP5) under EPL 3241 may need to be upgraded, replaced or duplicated. Any duplicated pipeline would run parallel to the existing 7 km excess water pipeline from the Kemira Valley storage tank to LDP5.









Product Coal Stockpile

ROM Coal Stockpile

Train Unloading

Proposed Conveyor Extension

Administration Building

Hydrocarbon Storage

Coal Preparation Plant

Maintenance Workshop

Store

Carpark

132kV Powerlines

Railway Lines

Proposed Upgrades to Infrastructure

DENDROBIUM MINE EXTENSION PROJECT

Figure: 4-8
Project General Arrangement -
Dendrobium Coal Preparation Plant

Version 2 21 February 2022

0 50 100 150 200
Metres

The anticipated size of any duplicated pipeline required to accommodate predicted increases in mine inflows would be similar to that of the existing pipeline, and would therefore be located within the existing infrastructure corridor.

4.4.11 Other Surface Facilities and Supporting Infrastructure Upgrades

Construction activities associated with water supply for ventilation shaft construction would be provided via one of the following options (Section 4.10.7):

- development of an underground pumping system and above-ground pipeline to supply recycled mine water from the Dendrobium Mine underground workings via a previous borehole site;
- development of a temporary pumping station at the Cordeaux River crossing (along Fire Trail 6) and water supply pipeline along Fire Trail 6 (subject to agreement to purchase water from WaterNSW); or
- delivery of water via water truck to Shaft Site No. 5A along Fire Trail 6.

The water supply options have been considered, as relevant, in the EIS (e.g. BDAR and Road Transport Assessment).

4.5 UNDERGROUND MINING OPERATIONS

The Project involves longwall mining operations within CCL 768 to (Figure 4-9) extract the Bulli Seam in Area 5.

The underground mining operations for the Project would extract approximately 31 Mt of ROM coal from Area 5.

The Project would involve extraction of up to 5.2 Mtpa of ROM coal from the Project underground mining area.

Over the life of the Project, ROM coal would also continue to be extracted from the approved Area 3. This coal extraction would occur under Development Consent DA 60-03-2001 (subject to obtaining an extension to the life of Development Consent DA 60-03-2001, where required).

There is uncertainty regarding the ability to extract the remaining resource in the approved Area 3C and the timing, which is contingent on IMC's ability to effectively drain gas from the seam to achieve levels that facilitate safe extraction of the resource.

Area 3C would be mined under Development Consent DA 60-03-2001; however, as the approved mine life of the Dendrobium Mine is 31 December 2030, the necessary extension to the operational life of the Dendrobium Mine under Development Consent DA 60-03-2001 to allow mining in the majority of Area 3C (i.e. areas where there is currently high gas content) after 31 December 2030 would be subject to a separate application for approval and is not part of this application.

Therefore, the Project would provide an opportunity to safely drain this gas before this portion of approved Area 3C is mined and, therefore, maintain continuity of Dendrobium Mine longwall operations.

Underground mining operations would be conducted on a continuous basis, 24 hours per day, seven days per week.

4.5.1 Mining Method

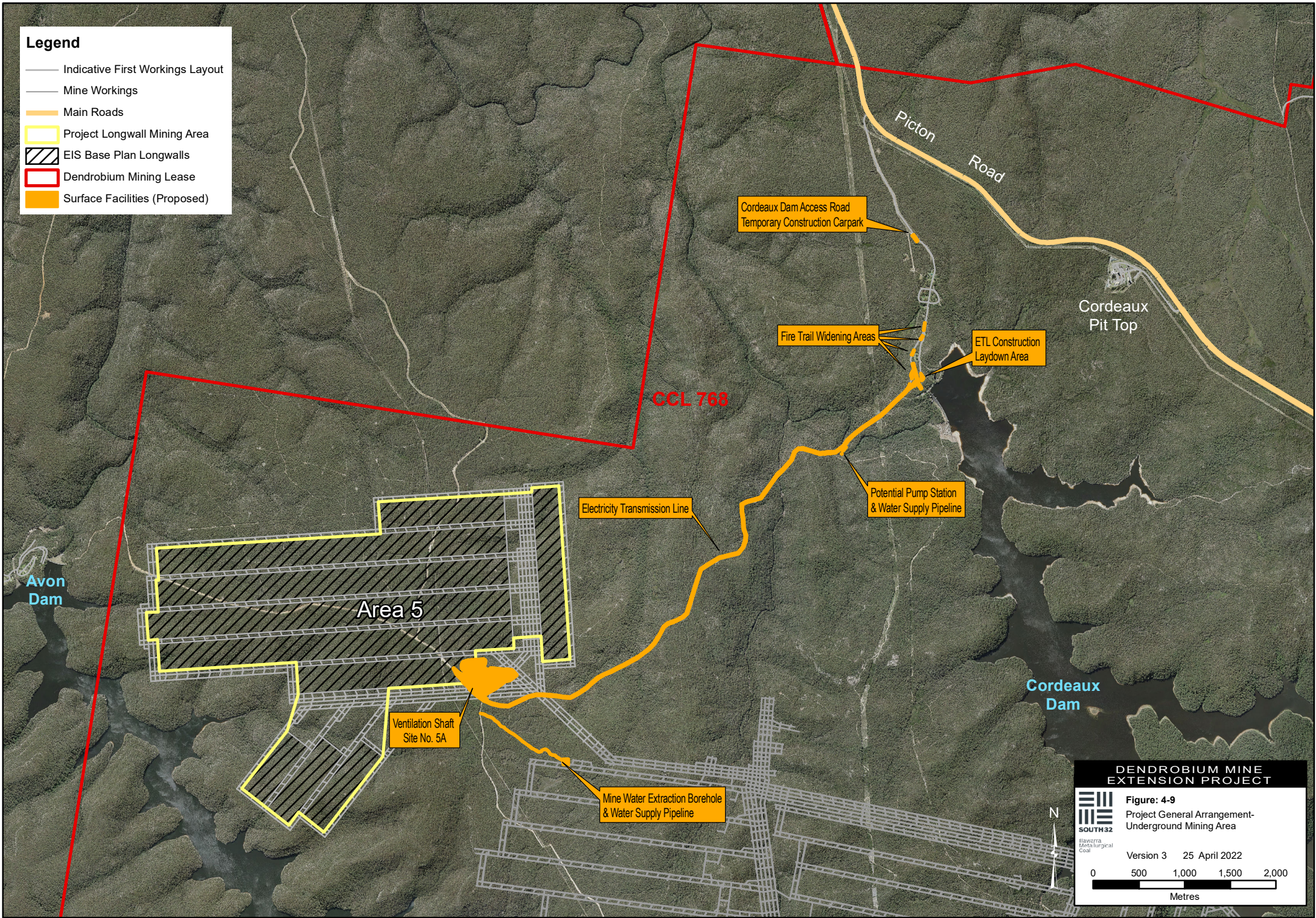
Longwall mining methods and equipment would continue to be employed for the Project. Longwall mining involves the extraction of rectangular panels of coal defined by underground roadways constructed around each longwall. The longwall mining machine travels back and forth across the width of the coal face, progressively removing coal in slices from the panel. Once each slice of coal is removed from the longwall face, the hydraulic roof supports are moved forward, allowing the roof and a section of the overlying strata to collapse behind the longwall machine (referred to as forming "goaf") (Figure 3-2).

Extraction of coal by longwall mining methods results in the vertical and horizontal movement of the land surface. The land surface movements are referred to as subsidence effects. The type and magnitude of subsidence effects depend on a range of variables including the mine geometry and topography, the depth of mining, the number of seams mined, the coal recovery from each seam, the nature of overlying strata and other geological factors. The subsidence effects pertinent to the Project include non-conventional and systematic subsidence movements.

Subsidence-related monitoring and remediation activities for the Project are discussed in Section 4.13.1 and described in detail in Section 7.3.

Legend

- Indicative First Workings Layout
- Mine Workings
- Main Roads
- Project Longwall Mining Area
- EIS Base Plan Longwalls
- Dendrobium Mining Lease
- Surface Facilities (Proposed)



DENDROBIUM MINE EXTENSION PROJECT

Figure: 4-9
Project General Arrangement-
Underground Mining Area

SOUTH32
Ilaverra
Santa Margalida
Coal

Version 3 25 April 2022

0 500 1,000 1,500 2,000
Metres

N

4.5.2 Project Mining Domain Constraints

The Project underground mining area (Area 5) is constrained by the extent of CCL 768 to the west and north and the extent of the approved Area 3 (under Development Consent DA 60-03-2001) to the east. Area 5 is also constrained by igneous intrusions in the Bulli Seam to the north and east, Avon Dam to the south and Avon River to the west.

IMC has designed the mine plan to target areas that would predominantly yield the highest quality metallurgical coal resource (i.e. rather than thermal or PCI product).

4.5.3 Project Longwall Design Features

Longwalls for the Project would have panel widths of approximately 295 m with a 5 m-wide gate road either side, resulting in a void of 305 m. The extraction height would be restricted to a maximum of 3.2 m.

A number of longwall design features have been incorporated in the Project underground mining layout to reduce potential environmental impacts in consideration of:

- previous mining experience at the Dendrobium Mine; and
- key stakeholder feedback (including the advice received from the IPC and IAPUM on the previous application).

IMC has identified a number of key natural and built features in the vicinity of CCL 768 that may be susceptible to subsidence impacts. These features would *not* be mined beneath and the Project has incorporated minimum setbacks from these features.

IMC has re-designed the Project to reduce the overall footprint thereby reducing potential impacts (compared to the previous application) through:

- no longwall mining beneath 3rd, 4th and 5th order (or above) streams;

- avoidance of longwall mining beneath identified key stream features (setback of 50 m when longwall mining will occur on one side of the “key stream feature” or 100 m when longwall mining will occur on more than one side);
- no longwall mining beneath previously identified high archaeological scientific significance Aboriginal heritage sites;
- minimum longwall mining distance of at least 400 m from named watercourses (i.e. the Avon River, Cordeaux River and Donalds Castle Creek);
- minimum longwall mining setback distance of 300 m from the FSL (i.e. maximum operating water level) of the Avon Dam;
- minimum longwall mining setback distance of 1,000 m from dam walls; and
- avoidance of the “Area 4” swamp cluster.

Final Project longwall layouts would be subject to review and approval as a component of future Extraction Plans developed in consultation with the relevant authorities and to the satisfaction of the Secretary of the DPE.

IMC would also implement an adaptive management approach to achieve any relevant performance measures to maintain the safety and serviceability of surface infrastructure during the life of the Project. Adaptive management would involve the monitoring and periodic evaluation of environmental consequences against subsidence performance measures and, if necessary, mitigation measures and/or the mine design and mining extent may be adjusted to achieve the Infrastructure Approval performance measures to maintain the safety and serviceability of surface infrastructure during the life of the Project.

Indicative Mining Schedule

An indicative mining schedule for the Project is presented in Table 4-3 and is based on the planned maximum ROM coal production rate of 5.2 Mtpa.

The actual timing and mining sequence may vary in consideration of localised geological features, coal quality characteristics, detailed mine design, mine economics, market volume requirements, and/or adaptive management requirements.

4.5.4 Underground Mine Access and Materials Handling

Underground Mine Access and Development Works

Personnel and materials access to Area 5 would be from the Dendrobium Pit Top and the Dendrobium Tunnel.

An access/egress winder and/or crane pad would also be installed at the proposed ventilation shaft site to facilitate emergency transportation to/from the underground mining operations.

Underground main roads would be developed to access and support the Project underground mining area (i.e. for access, ventilation and coal clearance).

Each longwall would be formed by developing gate roads (the tailgate and maingate roads). To construct the gate roads, roadways (headings) would be driven parallel to each other using continuous miners.

The headings that form the gate roads would be connected by driving a “cut-through” from one heading to another at regular intervals (e.g. at 130 m spacings) (Figure 3-2). This leaves a series of pillars of coal along the length of the gate road that support the overlying strata.

ROM Coal Handling

ROM coal would be transported from the Project underground operations to the Kemira Valley Coal Loading Facility via an underground conveyor network, reaching the surface via the Kemira Valley Tunnel.

At the facility, ROM coal would continue to be temporarily stockpiled before being loaded onto trains for transport to the Dendrobium CPP.

Up to 5.2 Mtpa of ROM coal from Areas 5 and 3 would be handled at the Kemira Valley Coal Loading Facility over the life of the Project.

A materials handling schematic for the Project, showing the handling of ROM coal, product coal and coal wash is shown on Figures 4-10a and 4-10b.

4.5.5 Major Underground Equipment

Underground equipment (such as shearers, longwall machines, continuous miners, conveyors and bins) and mobile fleet (such as load haul dump vehicles, drill rigs, shuttle cars and personnel carriers) would be used for the Project.

Underground equipment would be upgraded or replaced during the life of the Project as required.

4.5.6 Mine Ventilation Systems

Ventilation shafts, fans and associated surface infrastructure would be required for the Project to maintain a safe working environment within the underground workings.

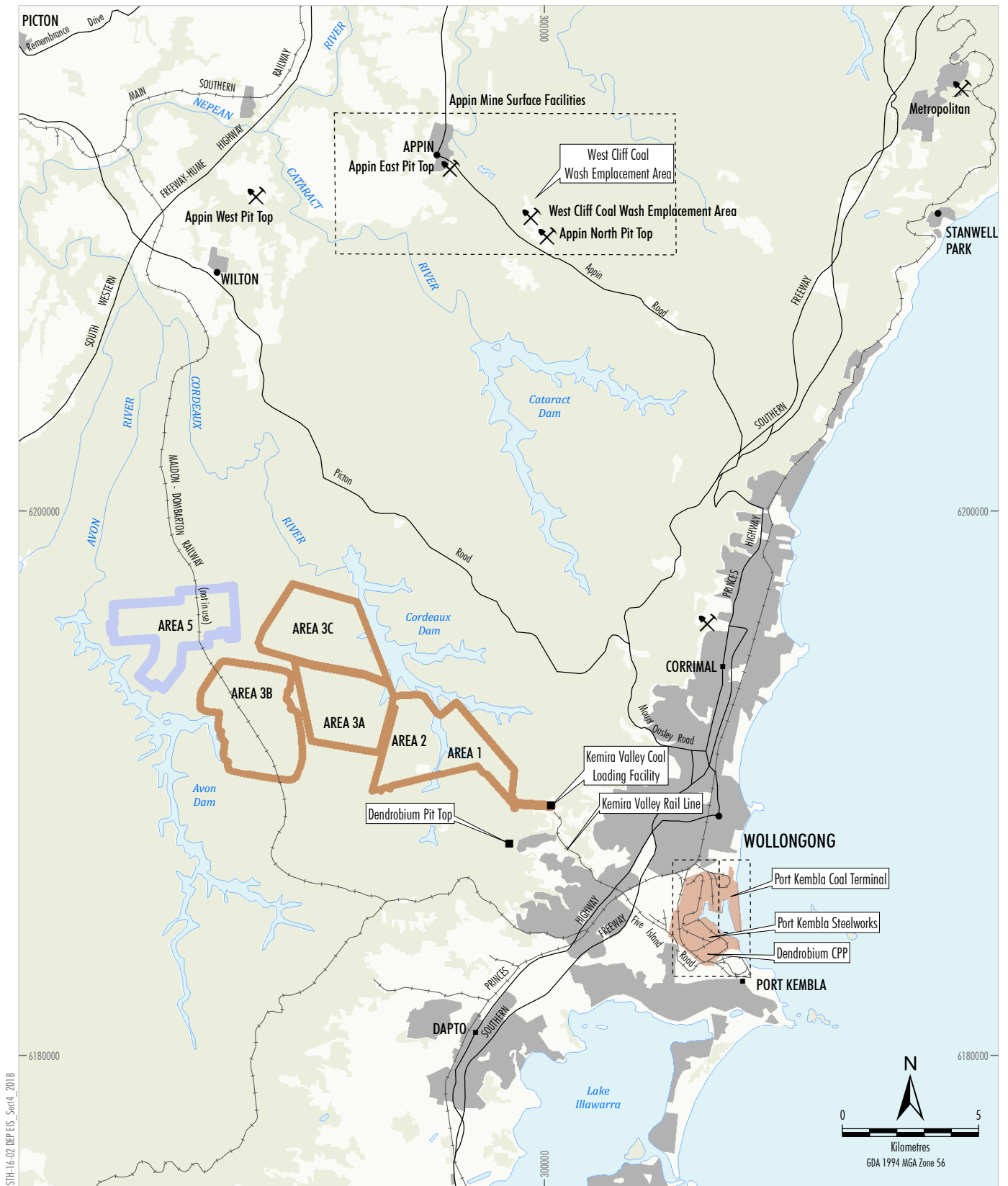
The Dendrobium No 1 Shaft and No 2 and 3 Shafts would continue to ventilate the Project underground mining area (Figure 4-3a).

No 1 and 2 Shafts are downcast (or intake) ventilation shafts that draw fresh air into the underground workings. No 3 Shaft (co-located within the No 2 and 3 Shafts) is currently an upcast (or exhaust) ventilation shaft that uses fans to draw air out of the underground workings.

The Project would also involve the development of an additional ventilation shaft site (Shaft Site No. 5A) to support Area 5 where two new shafts (No. 4 and No. 5 Shafts) are proposed to be constructed. The ventilation shaft site would include a downcast and an upcast ventilation shaft during the life of the Project.

The ventilation shaft site would have the following infrastructure:

- one upcast and one downcast shaft (concrete-steel composite lined or steel-lined shafts);
- up to three ventilation fans;
- power supply;
- electrical switchrooms, transformers, switchyard and other electrical infrastructure;



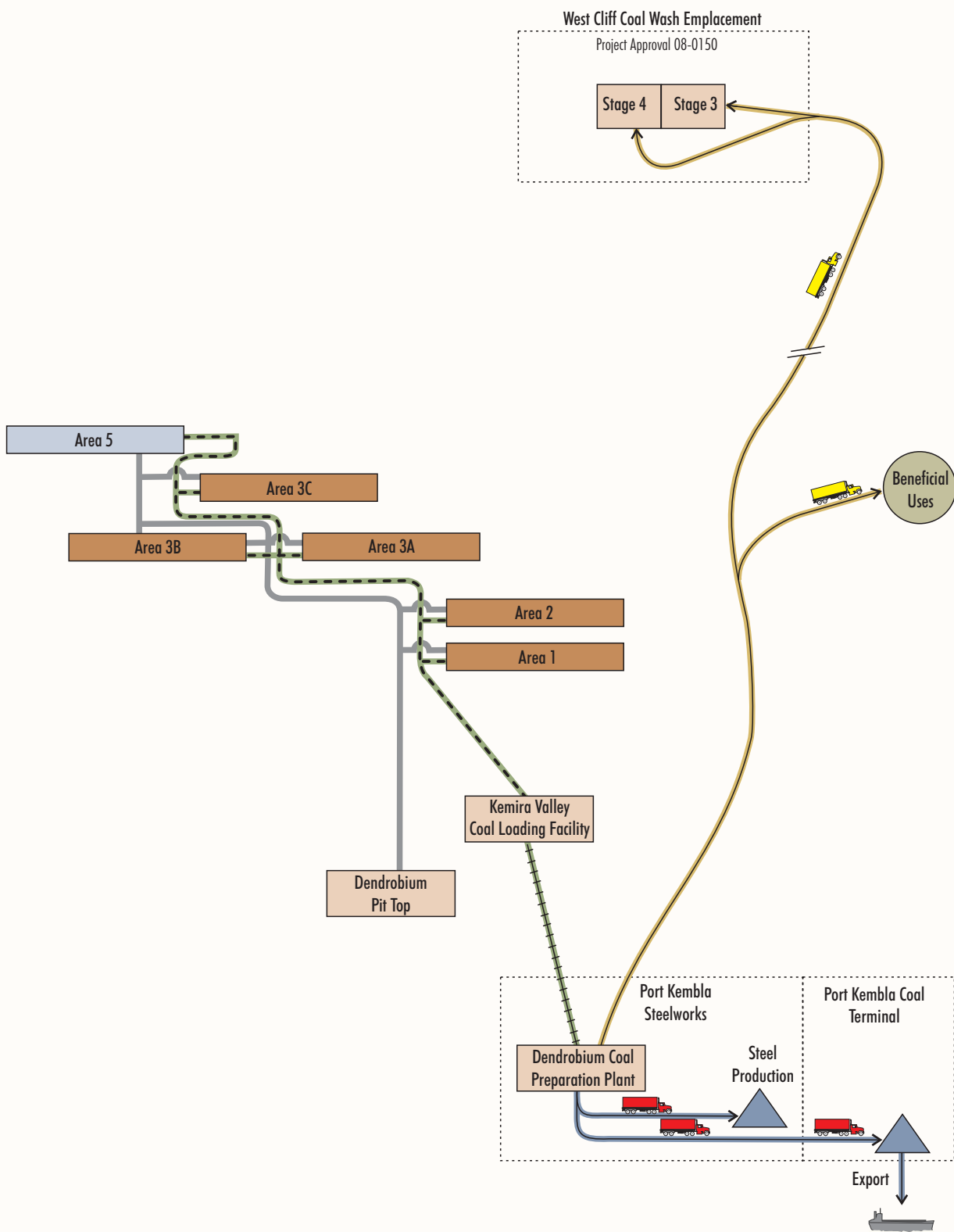
Source: Geoscience Australia, 2006; Department of Industry (2018);
Department of Finance, Services & Innovation (2018);



Illawarra Coal

DENDROBIUM MINE
Materials Handling
Spatial Relationship

Figure 4-10a



Not to Scale

LEGEND

- | | | | |
|--|----------------------------------------------------------------------|--|----------------------------------|
| | Illawarra Coal Surface Facility Area | | Road Transport - Surface |
| | Dendrobium Underground Mining Area - Proposed Project (SSI-33143123) | | Rail Transport - Surface |
| | Dendrobium Underground Mining Area - Existing Mine (DA 60-03-2001) | | Conveyor Transport - Underground |
| | Men & Materials - Underground | | Road Transport Private Roads |
| | ROM Coal | | Road Transport Public Roads |
| | Product Coal | | |
| | Coal Wash | | |
| | Third Party Product Coal Storage | | |



DENDROBIUM MINE
Material Handling Schematic Flowsheet

Figure 4-10b

Table 4-3
Indicative Mining Schedule

Project Year	ROM Coal Production (Mt)		ROM Coal Handling and Processing (Mt)		
	Approved Dendrobium Mine Mining (Area 3) (DA 60-03-2001)*	Project Underground Mining Area (Area 5)	Total ROM Coal	Coal Wash (Wet)	Total Product Coal
1	3.9	-	3.9	0.9	3.1
2	4.3	-	4.3	1.0	3.4
3	3.6	0.1	3.6	0.9	2.8
4	3.1	0.2	3.3	0.9	2.6
5	2.4	0.4	2.8	0.7	2.2
6	-	1.3	1.3	0.2	1.1
7	-	3.2	3.2	0.5	2.8
8	-	4.6	4.6	0.7	4.0
9	-	5.2	5.2	0.8	4.5
10	-	4.7	4.7	0.8	4.1
11	-	4.7	4.7	0.8	4.1
12	0.2	3.4	3.6	0.7	3.0
13	0.3	3.5	3.8	0.6	3.3
14	3.3	-	3.3	0.9	2.5
15	3.4	-	3.4	0.9	2.5
16	3.3	-	3.3	0.9	2.5
17	3.1	-	3.1	0.9	2.2
18	2.9	-	2.9	1.0	2.1

Note: The combined total of product coal and coal wash is greater than total ROM coal due to changes in moisture content. Other totals may not add exactly due to rounding. Forecast production tonnages cannot be accurately split into market segments, as product coal is blended with coal from the Appin Mine to meet customer specifications, and sold as a single IMC product. In addition, this information is considered commercial in confidence (as recognised by the MEG in its advice to the SEARs). IMC can provide this information commercial in confidence to DPE if requested.

* ROM coal extraction in Area 3 would continue to be conducted in accordance with Development Consent DA 60-03-2001.

- gas drainage, monitoring and management systems, which may involve gas reticulation and flaring;
- site access road and security fencing to prevent unauthorised access to the site;
- sediment control infrastructure; and
- other associated ancillary infrastructure (e.g. service boreholes, demountable buildings).

4.5.7 Gas Management and Abatement

Pre-mining gas drainage and goaf gas drainage would be required for the Project to reduce the gas content in the coal seam to levels suitable for safe underground mining operations.

Gas monitoring systems would be implemented for the Project to monitor gas composition of the air in the underground workings (e.g. carbon dioxide [CO₂] and CH₄ levels) to maintain a safe working environment.

Pre-Mining Gas Management

Gas would be drained from the Bulli Seam and adjacent strata by drilling in-seam (i.e. horizontal) boreholes into the coal seam in advance of mining. Pre-mining gas drainage would generally be facilitated by underground cross-panel drilling. Gas would be drained through an underground collection system and be delivered to centralised gas management infrastructure at the surface.

Post-Mining Gas Drainage

Gas would also be drained from the goaf area post-mining to ensure safe operations and maintain the rate of longwall mining operations. Post-mining gas drainage would also be undertaken via underground drilling methods into the Wongawilli Seam (i.e. the predominate source of gas following extraction of the Project longwalls). Gas drained from the goaf areas and Wongawilli Seam would be collected through the underground collection system for management at the surface.

Hierarchy of Gas Management and Abatement

Centralised gas management infrastructure would be constructed at the No 2 and 3 Shafts and/or Shaft Site No. 5A (Section 4.5.6).

A gas plant for the extraction of Longwalls 22 and 23 in Area 3C (anticipated to be extracted prior to Area 5) is expected to be required at the existing No 2 and 3 Shafts; however, this gas plant is not part of the Project.

Subject to the approval of a future development application for the proposed No 2 and 3 Shafts gas plant (e.g. via a Modification to the existing Dendrobium Mine Development Consent DA 60-03-2001) the gas plant is planned to be used for Area 5 gas drainage as well as for the remainder of Area 3C.

Alternatively, the Project proposes a gas plant would be developed at Shaft Site No. 5A for Area 5 gas drainage.

Gas would be delivered to the centralised gas management infrastructure via gas pumps, a network of underground pipes and a borehole. Surface gas management infrastructure would be fully fenced and may include flares, pumps, nitrogen tanks, gas monitoring, water collection, surface pipes and other ancillary infrastructure.

Gas would be flared in order to reduce greenhouse gas emissions or, if the gas was too low in CH₄ content for flaring (or other operational reasons), vented to the atmosphere. The height of ventilation infrastructure would be approximately 15 m when operational.

4.5.8 Water Management Systems

The Project underground mining operations would use a combination of potable water and recycled water.

Treated, recycled water would be used for underground dust suppression, cooling of underground equipment (development units and secondary supports) and for fire-fighting purposes (e.g. in the event of an on-site fire). Potable water from Sydney Water would be used for longwall hydraulic equipment and as a backup supply when recycled water is not available.

Water that accumulates in the underground workings, including groundwater inflows, would be collected and transferred directly into the Nebo workings and/or Kemira workings via a series of underground sumps, pumps and pipelines.

IMC would use flow meters to monitor the volume of water being pumped around the underground operations. Water that leaves the underground workings in ROM coal and ventilation air would continue to be monitored to inform periodic review of the site water balance.

Excess water that accumulates in the underground workings would continue to be discharged via the existing licensed discharge point to Allans Creek (LDP5) in accordance with EPL 3241.

It is noted that the receiving environment of LDP5 is a heavily-modified waterway, with the upper reaches of Port Kembla and Allans Creek constituting a concrete lined drain, before joining the downstream tidal zone where mixing/dilution occurs within Port Kembla and the Pacific Ocean.

4.6 ROM COAL TRANSPORT AND PROCESSING

4.6.1 ROM Coal Sizing, Stockpiling and Transport

Up to 5.2 Mtpa of ROM coal from Areas 5 and 3 would be transferred to the surface at the Kemira Valley Coal Loading Facility via the Kemira Valley Tunnel.

ROM coal would be conveyed from the Kemira Valley Tunnel to the existing coal sizing unit, which is a rotary breaker that reduces the top size of the coal (Figure 4-7).

Sized ROM coal would be conveyed to the rill tower and temporarily stored in a stockpile with an approximate capacity of 150,000 t, prior to being transported.

Train loading would continue to occur via feeders from the base of the stockpile, where coal is fed into rail wagons by either gravity or bulldozer.

Loaded trains would be sprayed with water to control dust emissions during transportation.

When required for stockpile management, a bulldozer or loader would operate on the stockpile between 7:00 am and 10:00 pm.

The Project would use the existing surface facilities at the Kemira Valley Coal Loading Facility, with minor augmentations and upgrades to existing equipment, as described in Section 4.4.8.

At the Dendrobium CPP, the train wagons would continue to be positioned over a rail unloading hopper system located below the rail line.

The unloaded coal would then be transferred to either the CPP feed bins or to a ROM stockpile area to the west of the rail line (Figure 4-7).

4.6.2 Dendrobium CPP

A general arrangement of the Dendrobium CPP is provided in Figure 4-8.

Sized ROM coal would be temporarily stockpiled at the Dendrobium CPP or fed directly into the Dendrobium CPP for processing at a rate of up to 5.2 Mtpa.

ROM coal would be fed through the existing conveyor and distributed amongst dense medium and flotation circuits for processing.

The Dendrobium CPP would produce the following main streams:

- metallurgical coal;
- energy coal; and
- coal wash.

The existing Dendrobium CPP comprises a range of components that can be generally classified into three major circuits, the coarse coal, small coal and fine coal circuits. Each of these circuits include components that separate coal materials on the basis of size (e.g. screens) and on the basis of material type (e.g. cyclones, flotation cells, jig/drum).

Each circuit has links to each of the other circuits for recycling of undersize or oversize material.

The small coal and fine coal circuits also include components that are used to dewater coal products (e.g. centrifuges) and the fine coal circuit includes components that are used to dewater coal and coal wash (e.g. thickeners, filters and tailings presses).

During the life of the Project, an existing thermal drying facility may be upgraded to reinstate operations and/or replaced with other dewatering units (e.g. thickeners and filters).

Metallurgical coal and energy coal product streams would exit the Dendrobium CPP via conveyor and would be stockpiled separately.

Coal wash would be transported to the coal wash loading bin.

ROM coal from the Appin Mine would continue to be transported to the West Cliff CPP for processing, however, could also be transported to the Dendrobium CPP for processing, if required (consistent with Project Approval 08_0150).

Further details on product coal handling and transportation and coal wash management are provided in Sections 4.7 and 4.8, respectively.

4.7 PRODUCT COAL HANDLING AND TRANSPORTATION

The product coal production schedule for the Project is provided in Table 4-3.

Product coal from the Dendrobium CPP would continue to be temporarily stockpiled prior to transport. Product coal would be transported from the Dendrobium CPP to the BlueScope Port Kembla Steelworks for use in the steelmaking process or to the PKCT for transport to Liberty Primary Steel Whyalla Steelworks or export. All product coal transportation would be via private internal roads within the Port Kembla industrial precinct.

Product coal transportation would occur on a continuous basis (24 hours per day, seven days per week).

4.8 COAL WASH MANAGEMENT

4.8.1 Coal Wash Production

Over the life of the Project, it is estimated that up to approximately 5.2 Mt of additional coal wash would be produced from the processing of coal from the Project underground mining area. Approximately 9.0 Mt of coal wash would also be produced from processing coal from remaining areas of Area 3 during the life of the Project (Table 4-4).

An indicative production schedule (including coal wash generation by the approved Appin Mine under Project Approval 08_0150) of coal wash required to be emplaced at the West Cliff Coal Wash Emplacement Area and/or available to be supplied for beneficial use is provided in Table 4-4.

While the total coal wash quantities are based on planned production (Section 4.6.1), the actual quantity produced in any one year may vary to reflect localised geological features, detailed mine design and the actual mine development sequence.

4.8.2 Coal Wash Physical and Chemical Characteristics

Coal wash generally consists of a mixture of carbonaceous shale and mudstone with minor proportions of sandstone. Small quantities of low-quality coal can also be present.

All coal wash (including coarse and fine coal wash) generated at the Dendrobium CPP reports to a single coal wash loading bin.

Table 4-4
Indicative Production Schedule of Coal Wash to be Emplaced at the West Cliff Coal Wash Emplacement Area and/or Available to be Supplied for Beneficial Use

Year	Coal Wash Production from Dendrobium Mine and Project Processing Activities (Mt)*	Approved Appin Mine Coal Wash Production (Mt)#	Total Coal Wash Production (Mt)
1	0.9	1.0	1.9
2	1.0	0.8	1.8
3	0.9	0.8	1.7
4	0.9	0.8	1.7
5	0.7	1.0	1.7
6	0.2	1.0	1.3
7	0.5	0.9	1.4
8	0.7	1.0	1.8
9	0.8	1.0	1.8
10	0.8	1.0	1.7
11	0.8	1.0	1.8
12	0.7	1.0	1.7
13	0.6	0.9	1.6
14	0.9	1.0	1.9
15	0.9	1.0	1.9
16	0.9	1.0	1.9
17	0.9	0.5	1.4
18	1.0	-	1.0
TOTAL	14.2	15.8	29.9

Note: Totals may not add exactly due to rounding.

* Includes coal wash generated from processing of ROM coal from the approved Dendrobium Mine (Area 3) mining areas and Project underground mining area (Area 5).

Approximation based on current mine scheduling. This would continue to occur under Project Approval 08_0150.

The coal wash material produced by the Dendrobium CPP is comprised primarily of silicon oxide, boehmite (an aluminium oxide hydroxide), carbon, iron oxide and moisture.

The material is not classified as hazardous according to Safe Work Australia criteria and is not classified as a dangerous good by the criteria of the Australian Dangerous Goods Code (ADG Code).

Contaminants in the coal wash material do not exceed the specific contaminant concentration or toxicity characteristics leaching procedure test values for general solid waste in the *Waste Classification Guidelines – Part 1: Classification of waste* (EPA, 2014).

Monitoring data shows that the combined underdrainage from Stages 1, 2 and 3 of the West Cliff Coal Wash Emplacement Area, following emplacement over approximately 40 years, is generally neutral or slightly alkaline.

The presence of the West Cliff Coal Wash Emplacement Area over that time is essentially a long-term batch trial and shows there is no evidence of acid generation from the coal wash.

The water quality impact assessment for the West Cliff Stage 3 Coal Wash Emplacement Area (EcoEngineers, 2007) concluded that there was unlikely to be export of significant concentrations of heavy metals or organic compounds from the emplacement area.

4.8.3 Beneficial Use of Coal Wash

IMC is committed to supporting the continued supply of coal wash for engineering purposes (e.g. civil construction fill) or for other beneficial uses.

Since 2009, IMC has diverted approximately 6 Mt of coal wash away from emplacement to alternate customers, with approximately 2.1 Mt diverted for beneficial uses during FY20 and FY21 (approximately 56% of total coal wash produced) (e.g. for use as an engineered fill in housing developments, Roads and Maritime Services [RMS] road infrastructure projects and for the development of arterial and agricultural roads).

As well as current shorter-term supply contracts, IMC has commercial arrangements in place for long-term supply of coal wash for a number of projects, including:

- Lend Lease – use as construction fill material at the Calderwood Valley residential development (approximately 5 Mt of coal wash material is forecast to be required by Lend Lease over the life of the Project); and
- Coordinated Logistics – use as an alternative to road construction material for projects in the Southern Tablelands and Nowra regions (approximately 0.1 Mtpa of coal wash material is forecast to be required by Coordinated Logistics).

It is anticipated there may be further use of coal wash from the Project at these and other developments during the life of the Project.

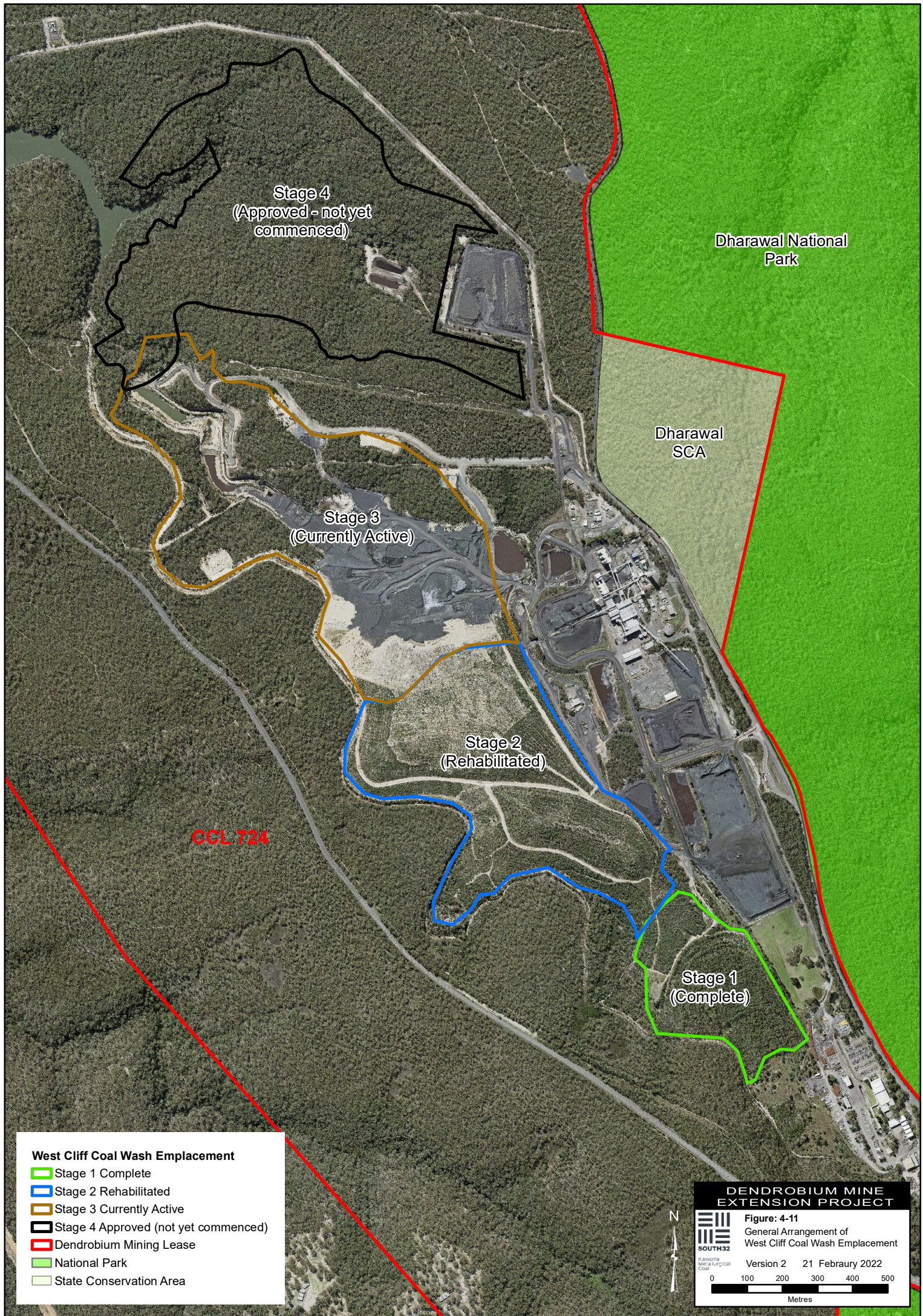
The Project would, therefore, involve the road transportation of up to 1 Mtpa of coal wash material from the Dendrobium CPP to customers for beneficial use, including in the Wollongong, Shellharbour, Macarthur, Southern Tablelands and Nowra regions.

In addition, IMC's Coal Wash Road Base Project was finalised in FY21, which utilised coal wash with other recycled materials such as fly ash to produce a material suitable for a variety of applications. IMC would continue to utilise coal wash and fly ash as an engineering fill (e.g. for haul road construction).

4.8.4 West Cliff Coal Wash Emplacement Area

The Project would involve the continued use of the West Cliff Stage 3 and Stage 4 Coal Wash Emplacement Area for the emplacement of coal wash that is not diverted to alternate beneficial use (Figure 4-11).

Coal wash from the Dendrobium CPP would be loaded into trucks from the existing coal wash loading bin. The transport of washed coal from the Appin North Pit Top to Port Kembla is currently undertaken by haul trucks operating under Project Approval 08_0150 for the Appin Mine, and these trucks would continue to be back-loaded for transporting coal wash from the Dendrobium CPP to the West Cliff Coal Wash Emplacement Area.



The currently approved West Cliff Coal Wash Emplacement Area has sufficient capacity for the Project, the approved Dendrobium Mine and the approved Appin Mine (the West Cliff Stage 4 Coal Wash Emplacement Area [not yet commenced] has an approved capacity of 26 Mt).

Development and rehabilitation of the West Cliff Coal Wash Emplacement Area would continue to be conducted in accordance with Project Approval 08_0150 for the Appin Mine.

However, as ongoing use of the West Cliff Stage 3 and Stage 4 Emplacement Areas is proposed as part of the Project, notwithstanding, operation of the West Cliff Stage 3 and Stage 4 Emplacement Areas would continue under Appin Mine Project Approval 08_0150 (Section 1.1.7).

It is intended that development and rehabilitation of the West Cliff Stage 3 Coal Wash Emplacement Area would continue to be integrated with the management activities at the West Cliff Colliery surface facilities, including continued implementation of the West Cliff Coal Wash Emplacement Area Management Plan.

4.9 WATER MANAGEMENT STRATEGY

Underground and surface operations would continue to use a combination of potable and recycled water. Potable water would be supplied by Sydney Water. Recycled water would continue to be sourced from the adjacent underground mine workings.

The Project water management schematic is shown on Figure 4-12.

A description of the water management system for the Project is provided below.

4.9.1 Underground Operations

The underground mining operations for the Project would be supported by water management systems to transfer accumulated water from the underground workings directly into the Nebo workings and/or the Kemira workings, which act as water storage areas for the Dendrobium Mine (Appendix C).

Further details on water management systems for the underground mining operations of the Project are provided in Section 4.5.8.

The site water balance demonstrates that sufficient water supply is available to meet the demand of the underground operations (Appendix C).

4.9.2 Dendrobium Pit Top

The Project would continue to use the existing water management facility at the Dendrobium Pit Top to separate clean, oily and dirty water.

Potable water would continue to be supplied from Sydney Water for use in the bathhouses and associated facilities, and for use as part of underground mining operations (e.g. for equipment use).

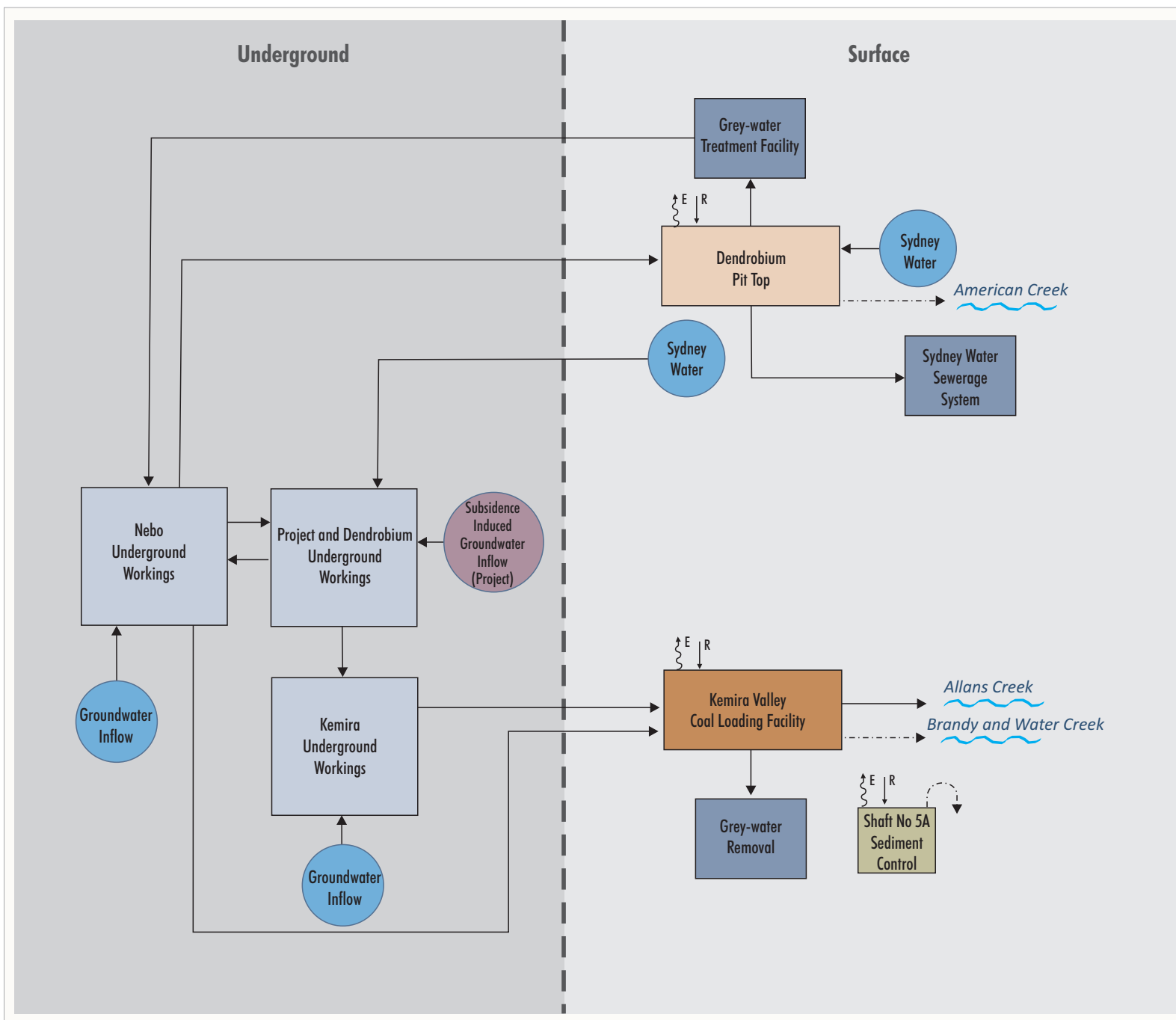
Effluent from bathhouse and office facilities would be separated into grey water and sewage streams (Appendix C). Sewage would be directed to the town sewerage system. Bathhouse grey water along with water from the washdown bay, workshop and sedimentation ponds would be treated at the water treatment facility prior to being injected back into the Nebo workings.

Recycled water, sourced from the Nebo workings, would also be used for:

- dust suppression;
- washdown; and
- general hose-down purposes.

Runoff from the general yard area and portal road would continue to be directed to the sedimentation pond. Water from the sedimentation pond would be pumped to the water treatment facility prior to injection into the Nebo workings. Water from the Nebo workings is dosed with sodium hypochlorite before being recycled for use in the Dendrobium Pit Top or Kemira Valley (Appendix C). Runoff from the washdown bay would continue to be directed to the water treatment facility, where it would be processed through an oil water separation unit prior to being injected back into the Nebo workings.

The site water balance identifies that sufficient water supply is available to meet the demand at the Dendrobium Pit Top (Appendix C). Pumping infrastructure would recycle surplus and effluent flows to the Nebo workings. A portion of this water is recycled for use at the surface facilities as well as for underground operations.



LEGEND

- Overflow
- ↓ R Pumped Flow
- ↓ Rainfall/Runoff
- ↑ E Evaporation

DENDROBIUM MINE

Project Water Management Schematic

Figure 4-12

4.9.3 Kemira Valley Coal Loading Facility

The Kemira Valley Coal Loading Facility would continue to use recycled water, runoff water and stormwater for the Project. Recycled water would be sourced from the Nebo workings and Kemira workings and stored on-site in the break tank.

Recycled water would be used for:

- dust suppression (backup supply);
- general hose-down purposes; and
- amenities (e.g. toilets).

Stormwater would continue to be captured at the Kemira Valley Coal Loading Facility via the on-site sediment ponds and buffer dam. Stormwater would continue to be used as the primary supply for the Kemira Valley Coal Loading Facility dust suppression system and to maintain the water level in the fire tank (Appendix C).

Excess mine water that accumulates at the Kemira Valley Coal Loading Facility from the underground mine workings would continue to be discharged via the existing licensed discharge point to Allans Creek (LDP5) under EPL 3241.

The site water balance demonstrates that sufficient water supply is available to meet the demand at the Kemira Valley Coal Loading Facility (Appendix C).

Sewage and effluent at the Kemira Valley Coal Loading Facility would continue to be removed by a licensed waste contractor.

4.9.4 Cordeaux Pit Top

The surface facilities at Cordeaux Pit Top (Figure 4-6) have been designed to prevent waste water runoff from the site entering WaterNSW land. Runoff from hardstand areas would continue to be directed to a holding dam (Appendix C).

Water from the holding dam would continue to be transferred by pump to a settlement dam. The water would then be transferred to underground mine workings via a gravity feed pipeline. This arrangement negates the need for surface discharge (Appendix C).

Clean area catchment runoff from the Cordeaux Pit Top (including the sealed employee carparking area) would continue to report to the sand filter lagoon and would leave the site via the sand filter underflow discharge point (Appendix C).

Potable water would continue to be brought to the site by road tanker as required (Appendix C).

The existing stormwater controls and sewage treatment system (effluent holding tank serviced by road tanker) at Cordeaux Pit Top is adequate for its current use; however, it would be upgraded where required for the Project.

4.9.5 Ventilation Shafts

The No 1 Shaft has been revegetated to control runoff and erosion, and runoff flows to the surrounding landscape.

The No 2 and 3 Shafts has been revegetated to minimise the potential for the release of sediment-laden water to the surrounding landscape.

The No 2 and 3 Shafts would continue to capture site water runoff in existing sediment ponds.

The additional ventilation shaft site (i.e. Shaft Site No. 5A) would be constructed with appropriate erosion and sediment control infrastructure consistent with contemporary design principles (e.g. the “Blue Book”).

Water supply for ventilation shaft construction would be provided via one of the following options (Section 4.10.7):

- development of an underground pumping system and above-ground pipeline to supply recycled mine water from the Dendrobium Mine underground workings via a previous borehole site;
- development of a temporary pumping station at the Cordeaux River crossing (along Fire Trail 6) and water supply pipeline along Fire Trail 6 (subject to agreement to purchase water from WaterNSW); or
- delivery of potable water via water truck to Shaft Site No. 5A along Fire Trail 6.

Process water used for the construction of Shaft Site No. 5A and excess site surface water (stored in the sediment pond) would be pumped to the underground workings (and ultimately discharged at the licensed discharge point at Allans Creek [LDP5] under EPL 3241 at Unanderra) or trucked off-site.

4.9.6 Dendrobium CPP

Dendrobium CPP would continue to use recycled water from the BlueScope Port Kembla Steelworks recycled water network (supplied by Sydney Water) for use in the Dendrobium CPP and potable water purchased from Sydney Water for the administration building and associated amenities (Appendix C).

Dendrobium CPP water would be reclaimed from the process through a floor drain into collection pits where pumps would be used to deliver water back to the CPP.

Sewage and effluent would continue to be directed to the site's sewerage system.

4.10 INFRASTRUCTURE AND SERVICES

Existing surface infrastructure and services would continue to be used throughout the Project life, with required upgrades and extensions.

Surface infrastructure and services would continue to operate 24 hours per day, seven days per week. The Project involves the use of the existing Cordeaux Pit Top, including current mining support activities, with minor upgrades as described in Section 4.4.6. Mining infrastructure at the Cordeaux Pit Top site is currently under care and maintenance.

4.10.1 Surface Facilities

The Project would use the existing surface facilities (such as administration buildings, bathhouses, workshops and storage areas) with upgrades and extensions as required (Section 4.4).

An indicative surface mobile equipment fleet, which would be used during periods of typical operations, is provided in Appendix J. Additional surface fleet may be present for short periods; for example during longwall change-outs, scheduled plant shutdowns or other maintenance programs over the life of the Project (Section 4.4).

4.10.2 Access Roads and Haul Roads

The Project would continue to use existing access roads at the surface facilities at the Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Cordeaux Pit Top, Dendrobium CPP and the Dendrobium Shafts.

A new access road would be constructed off Cordeaux Road to service the additional carparking area for the Dendrobium Pit Top, with new pedestrian access (e.g. pedestrian road crossing). Access roads would also be developed or improved for the new ventilation shaft site, as required.

As the underground mining operations progress, additional minor unsealed access roads would be developed, where required, to support surface monitoring, remediation or exploration activities. Wherever practical, existing access roads would be used.

The Project would involve minor culvert and fire trail upgrades (e.g. trail widening) at a number of stream crossings and locations along Fire Trail 6 to facilitate equipment access for the construction of Shaft Site No. 5A. The upgrade works would be undertaken in consultation with WaterNSW (Figure 4-3a).

Other minor fire trail upgrades (e.g. trail widening and use of laydown areas) may be required over the life of the Project to support construction activities.

Product coal transportation from the Dendrobium CPP to the BlueScope Port Kembla Steelworks or the PKCT would continue to use existing private internal haul routes.

Coal wash from the Dendrobium CPP would continue to be hauled to the West Cliff Coal Wash Emplacement Area and to customers for beneficial use in the region via the public road network.

4.10.3 Carpark Facilities

The Project would continue to use existing Dendrobium Mine carparking facilities.

The Project would include the construction of additional carparking facilities on the southern side of Cordeaux Road, opposite the Dendrobium Pit Top, including an additional intersection with Cordeaux Road.

During construction of Shaft Site No. 5A, a temporary carparking facility would be required to accommodate the construction workforce, which is proposed to be located at one of the following:

- the existing Cordeaux Dam Picnic Area carpark; or
- within a cleared road verge/fire break management area adjacent to the Cordeaux Dam Access Road.

IMC would consult with WaterNSW regarding the selection of the final construction carpark location for the Project, and would implement appropriate security, erosion and sediment controls and bushfire management measures, as required.

4.10.4 Energy and Electricity Supply and Distribution

Energy consumption would be in the form of diesel fuel and electricity.

Diesel fuel demand would be associated with the use of mobile equipment (such as stockpile dozers, personnel and materials transporters and vehicles servicing the underground mining operations).

The main electricity requirements for the Project would include:

- mine ventilation fans;
- coal conveyance equipment;
- coal cutting equipment;
- compressors;
- bathhouse heating;
- other underground mining operations; and
- coal processing at the Dendrobium CPP.

The Endeavour Energy high voltage distribution network would continue to supply most of the electricity requirements of the Project.

Electricity for the Project underground mining operations would be distributed via the existing substation located adjacent to the Kemira Valley Coal Loading Facility. Electricity would be reticulated to the underground mining operations through cables running along the coal conveyor route. An additional transformer and other associated works would be required at Kemira Valley over the life of the Project.

Construction power supply for Shaft Site No. 5A would be via a new private 33 kV ETL proposed along Fire Trail 6 (primarily within existing disturbed areas) connecting the site to the existing Endeavour Energy 33 kV line at a location proximal to Cordeaux Dam wall (disturbance of approximately 4 ha of native vegetation) (Figure 4-3a).

Following construction of Shaft Site No. 5A, the ETL would be upgraded (if required) for use as operational power supply for Shaft Site No. 5A.

As the Project progresses, additional powerlines and/or substations and upgrades to existing powerlines would be required, and would be subject to separate approvals through the relevant electricity supply authority (Endeavour Energy).

4.10.5 Surface Services

Services such as compressed air, diesel, electricity and water required for the advancing longwall operations or ventilation would be delivered from the surface via the Dendrobium Pit Top and service boreholes located at Shaft Site No. 5A.

As the mining operations progress, additional service boreholes may be installed, and would generally be located adjacent to other surface infrastructure areas (e.g. new ventilation shaft), resulting in minimal additional disturbance.

If required outside of the proposed ventilation shaft site disturbance area, the installation of service boreholes and other surface infrastructure would be subject to environmental assessment studies. These studies and any associated management measures would be detailed in a Surface Services Management Plan. The Surface Services Management Plan would be prepared to the satisfaction of the Secretary of the DPE.

The preparation of a Surface Services Management Plan would include:

- A Vegetation Management Protocol that minimises any potential disturbance of natural vegetation. Surveys would be conducted for threatened flora species and threatened ecological communities (TECs). If any threatened flora species are identified, the proposed site would be relocated to avoid any associated impacts. Clearing of TECs would be avoided, where practicable, and disturbance minimised.
- Design of erosion and sediment control and site water management measures in accordance with applicable guidelines and in consultation with WaterNSW.
- Site-specific Aboriginal heritage inspections and, if required, relocation of the proposed service borehole sites to avoid impacts to known Aboriginal heritage sites.
- Progressive rehabilitation of the disturbance areas, such that only a practical minimum area is disturbed at any one time.

4.10.6 Site Security and Communications

Existing site security measures would be retained for the Project with upgrades as necessary. Additional security fencing for the Project would be erected where necessary (e.g. at the ventilation shaft site).

The existing communications systems at the surface facilities and underground mining operations would be retained for the Project with augmentations as necessary.

If required outside of the proposed ventilation shaft site disturbance areas, surface works associated with the installation of, or augmentation to, the communication systems would be subject to preparation of supplementary specialist environmental assessment studies. These studies and any associated management measures would be detailed in a Surface Services Management Plan (Section 4.10.5).

4.10.7 Water Supply and Use

Underground and surface operations would continue to use a combination of potable and recycled water. Potable water would be supplied by Sydney Water. Recycled water would continue to be sourced from underground workings, including adjacent underground mine workings.

Water supply for ventilation shaft construction would be provided via one of the following options:

- development of an underground pumping system and above-ground pipeline to supply recycled mine water from the Dendrobium Mine underground workings via a previous borehole site. The pipeline and infrastructure required at the previous borehole site would be located within existing disturbance areas, where possible;
- development of a temporary pumping station at the Cordeaux River crossing (along Fire Trail 6) and water supply pipeline along Fire Trail 6 (subject to agreement to purchase water from WaterNSW). The pipeline would be located along existing disturbed corridors, where possible; or
- delivery of potable water via water truck to Shaft Site No. 5A along Fire Trail 6.

Further details on water supply and use for the Project are provided in Section 4.9.

4.11 WASTE MANAGEMENT STRATEGY

The Project would generate waste streams of a similar nature to current waste generation at the Dendrobium Mine. Waste sorting would be limited on-site with the majority of recyclable and general waste being recycled or disposed of off-site at an approved waste management facility. The key waste streams for the Project would comprise:

- coal wash not used for beneficial uses (as described in Section 4.8);
- pre-mine/goaf drainage gas (as described in Section 4.5.8);
- general solid waste and recyclables;
- waste oil and grease;
- sewage and effluent; and
- minor quantities of other waste types from mining and workshop activities (e.g. used tyres and oil filters).

IMC would continue to apply general waste minimisation principles (i.e. reduce, re-use and recycling where practicable) to minimise the quantity of wastes that require disposal. The Project would also continue to research and, where it is relevant to do so, develop and implement waste management practices to ensure the disposal waste is minimised.

An overview of the waste types likely to be generated by the Project is presented in Table 4-5.

Further details on the management of general waste and sewage and effluent are provided below.

4.11.1 General Waste

General waste produced by the Project at the surface facilities would continue to be deposited into general waste bins. General waste surface bins would be disposed of by a licensed waste contractor. General waste produced at the underground mining areas would continue to be transported from underground general waste bins to an off-site approved waste handling facility for sorting and recycling or disposal.

4.11.2 Sewage and Effluent

Sewage produced at the Dendrobium Pit Top and sewage and effluent produced at the Dendrobium CPP would continue to be plumbed into the town sewerage system.

Table 4-5
Waste Streams Likely to be Generated by the Project

Waste Stream	Indicative Waste Class ¹	Management Method
Coal wash (not used for beneficial uses)	General Solid Waste (non-putrescible)	Refer to Section 4.8.
Timber, cardboard, paper, steel, scrap metal, commingle, food waste, etc.	General Solid Waste (non-putrescible and putrescible)	Transported to an approved waste handling facility and recycled or disposed as required.
Used oil filters	General Solid Waste (non-putrescible)	Temporarily stored on-site in designated bins prior to removal from site by an appropriately licensed waste contractor.
Used particulate filters		
Other workshop wastes (e.g. rags and oil-absorbent materials that only contain non-volatile hydrocarbons and do not contain free liquids)		
Tyres	Special	Used tyres would be segregated and collected for either repairs (if possible) or disposal by a licensed waste contractor.
Bathhouse water	Liquid	On-site treatment at Dendrobium Pit Top water treatment facility and re-use as recycled water.
Sewage effluent	Liquid	Refer to Section 4.11.2.
Waste oil and grease	Liquid	Used containers would be drained into bulk containers and temporarily stored prior to collection by a licensed contractor for processing off-site.
Waste water from ventilation shaft construction, compressor plant and gas plant	Liquid	Temporarily contained on-site, and then either pumped underground and treated, or trucked off-site for treatment and disposal by an appropriately licensed waste contractor.
Hazardous waste (e.g. explosives, lead-acid or nickel-cadmium batteries and containers that have not been cleaned containing residue of dangerous goods)	Hazardous	Temporarily stored on-site in a designated area prior to removal from the site by licensed contractors.
Contaminated waste or asbestos (if identified)	-	Further assessment and advice would be sought from a suitably qualified consultant regarding waste classification, handling, treatment, disposal and reporting requirements prior to appropriate disposal.

¹ Described or pre-classified waste in *Waste Classification Guidelines Part 1: Classifying Waste* (EPA, 2014).

Wastewater from bathhouses at the Dendrobium Pit Top would be treated at the on-site water treatment facility. Treated bathhouse water from the Dendrobium Pit Top would be recycled on-site.

Sewage and effluent at the Kemira Valley Coal Loading Facility would continue to be removed by a licensed waste contractor.

Sewage and effluent at the Cordeaux Pit Top would continue to be held in the sewage holding tank and removed by a licensed waste contractor.

4.12 MANAGEMENT OF DANGEROUS GOODS

The transportation, handling and storage of all dangerous goods for the Project would be conducted in accordance with the requirements of the NSW *Work Health and Safety Regulation 2017*.

The dangerous goods stored for the Project would include compressed gases, flammable and combustible liquids, and corrosive substances.

Based on the quantities proposed to be stored for the Project, it is not anticipated that a Dangerous Goods Licence would be required.

4.12.1 Transport

Dangerous goods required for the Project would be transported in accordance with the appropriate State legislation.

4.12.2 Hydrocarbon Storage

Dendrobium Pit Top

There are three existing hydrocarbon bunded areas that would continue to be used for the Project.

Existing procedures to maintain safe working conditions of the bunded areas, including regular inspections, would continue to be employed for the Project.

The Dendrobium Pit Top has two bulk chemical storage containers within the bunded areas, one for hydraulic oil storage (approximately 16,000 litre (L) oil storage capacity) and one for diesel storage, that would be utilised by the Project. Hydrocarbon storages would be operated in accordance with the requirements of AS 1940-2004 *The Storage and Handling of Flammable and Combustible Liquid*. Hydrocarbons would be delivered to site by tanker.

In addition to the above permanent bunded areas, portable bunds would continue to be used for transient storage or for transportation of oils and fuels around the site.

Where there is a higher risk of potential for hydrocarbon spillage, spill kits and/or bins containing oil absorbent material would be present. Surface personnel would be made aware of the locations of these spill kits and absorbent material bins in their work area. The contents of the spill kits and the oil absorbent material bins would continue to be inspected on a regular basis.

Dendrobium CPP

There are two existing hydrocarbon bunded areas at the Dendrobium CPP that would continue to be used for the Project, including a Methyl iso-Butyl Carbinol storage tank and a diesel storage tank. A small grease and oil storage area is maintained within the main Dendrobium CPP building.

Cordeaux Pit Top

The existing underground bulk diesel storage tank at the Cordeaux Pit Top (approximately 42,000 L holding capacity) would continue to be used for the Project. The storage tank would be managed in accordance with the *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* (or equivalent).

Other Surface Facilities

Any storage of hydrocarbons at other surface facilities would use self-contained and bunded vessels.

4.12.3 Explosives Storage

The existing explosives storage facilities at the Dendrobium Pit Top and Cordeaux Pit Top would be maintained on-site in the event that the underground operations or an emergency require the use of explosives.

The storage of explosives would be conducted in accordance with the NSW *Explosives Act 2003* and NSW *Explosives Regulation 2013*.

Explosives would be stored on-site in limited quantities and within the Licence to Store Explosives currently in place at the Dendrobium Pit Top.

4.12.4 Other Substances

The management and storage of chemicals for the Project would be conducted in accordance with IMC's prescribed management procedures, and Australian Standards and Codes.

IMC would continue to assess new substances before their use on-site by completing a substance evaluation and risk assessment. Safety Data Sheets and substance evaluations would be available to site personnel.

4.13 REHABILITATION AND REMEDIATION ACTIVITIES

The Project includes ongoing rehabilitation and remediation activities and rehabilitation at mine closure.

4.13.1 Subsidence Monitoring and Remediation

Collection of environmental baseline data and monitoring of subsidence effects, subsidence impacts and associated environmental consequences would occur throughout the life of the Project.

Remediation and rehabilitation of subsidence impacts and associated environmental consequences would occur in accordance with approved Extraction Plans and in consultation with DPE and WaterNSW.

Subsidence monitoring and remediation methodologies are described in Attachment 9 and Appendix A.

4.13.2 Decommissioning and Rehabilitation of Surface Facilities

Surface facilities used for the Project would be decommissioned when they are no longer required or at the end of the mine life where no further ongoing beneficial use is identified.

At closure, works would include the decommissioning and removal of infrastructure and land rehabilitation. In the long-term, all sites would be rehabilitated to a safe, stable and sustainable landform with the majority of sites of a similar character to surrounding areas.

IMC has identified a number of final (post-mining) land uses in consideration of strategic land use objectives and land zoning.

Further details of the Project rehabilitation and mine closure activities are provided in Attachment 9.

4.13.3 Coal Wash Emplacement Area Rehabilitation

It is intended that development and rehabilitation of the West Cliff Coal Wash Emplacement Area would continue to be integrated with the management activities at the West Cliff CPP surface facilities, including continued implementation of the West Cliff Coal Wash Emplacement Area Management Plan in accordance with Project Approval 08_0150 for the Appin Mine.

Ongoing use of the West Cliff Stage 3 and Stage 4 Emplacement Areas is proposed as part of the Project, notwithstanding, operation of the West Cliff Stage 3 and Stage 4 Emplacement Areas would continue under Appin Mine Project Approval 08_0150 (Section 1.1.7).

Progressive rehabilitation of completed sections of the Coal Wash Emplacement Area would be ongoing. The active emplacement area is kept to a practicable minimum, and as each section of fill reaches the designed height and landform, topsoil is applied and revegetation works are implemented.

Further details of the rehabilitation of the West Cliff Stage Coal Wash Emplacement Area are provided in Attachment 9.

4.13.4 Mine Closure (Sealing)

At closure, decommissioning and rehabilitation works would include sealing of mine entrances and management of seepage at the mine entrances.

Design concepts for the Project for the sealing of portals and mine entrances post-closure builds on the existing mine closure design work undertaken for the Dendrobium Mine and described in the Dendrobium MOP (South32, 2015a).

Further details of the preliminary sealing designs for the Project are provided in Attachment 9 and Appendix Q and would be detailed in the Mine Closure Plan for the Project.

4.14 WORKFORCE

4.14.1 Construction and Development

Additional personnel would be required for construction and development activities throughout the life of the Project (Section 4.4):

- Development of underground roadways to access the Project underground mining area.
- Development of coal clearance infrastructure and other ancillary infrastructure required to support the Project underground mining area.
- Construction and development of the ventilation shaft site and associated infrastructure (e.g. ETL).
- Upgrades to the Dendrobium Pit Top.

Additional contractors would also be required during the operational life of the Project; for example, at the Dendrobium Pit Top during longwall change-outs, and at the Dendrobium CPP during shutdown activities.

Construction would generally occur during standard construction hours (i.e. Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays or public holidays). Some construction and development works (e.g. drilling and construction of ventilation shafts, and underground development activities) would occur on a 24-hour per day basis.

4.14.2 Operations

The existing operations at the Dendrobium Mine have a combined operational workforce of approximately 650 people (including IMC staff and on-site contractor personnel).

It is anticipated that the operational workforce would be augmented during the Project to accommodate additional development units and additional gas management works. At full development, the Project would employ approximately 700 operational personnel. This would continue to include a mixture of IMC staff and on-site contractor personnel. Contractor numbers would vary based on operational requirements and/or to address short-term staffing constraints.

It is estimated that the Project operational workforce would peak in 2029.

Operations would continue to occur 24 hours per day, seven days per week. The current shift arrangements at the Dendrobium Mine are:

- Administration personnel – 8:00 am to 5:00 pm weekdays.
- Operations day shift personnel – 6:00 am to 4:00 pm Monday to Thursday, 6:00 am to 6:00 pm Friday to Sunday.
- Operations afternoon shift personnel – 2:00 pm to 12:00 am Monday to Thursday.
- Operations night shift personnel – 10:00 pm to 8:00 am Monday to Thursday, 8:00 pm to 8:00 am Friday to Sunday.
- Dendrobium CPP day shift personnel – 7:00 am to 7:00 pm Monday to Sunday.
- Dendrobium CPP night shift personnel – 7:00 pm to 7:00 am Monday to Sunday.

Intermittent maintenance shutdown periods at the Dendrobium CPP would continue to occur for the Project (approximately 3 weeks per year), with up to 200 contractor personnel required in these periods; however, these activities would not result in any additional operational workforce.

The current shift arrangements at the Dendrobium Mine would generally be retained. During the life of the Project alternative shift configurations may be required to meet operational and industry best practice requirements, or to minimise interaction with non-mine peak hour traffic. The operational workforce would continue to predominantly reside locally (e.g. within the Wollongong and Shellharbour LGAs).

4.14.3 Summary of Operating Hours

Operations

Operations would generally occur on a continuous basis, 24 hours per day, seven days per week (Section 4.14.2).

In addition, trains would not travel on the Kemira Valley Rail Line between 11:00 pm and 6:00 am unless written approval is obtained from the EPA for emergency use of the rail line.

Stockpile management at the Kemira Valley Coal Loading Facility (using bulldozer or loader) would occur between 7:00 am and 10:00 pm (Section 4.6.1).

Construction

Construction would generally occur during standard construction hours (i.e. Monday to Friday 7:00 am to 6:00 pm, Saturday 8:00 am to 1:00 pm and no work on Sundays and Public Holiday) (Section 4.3).

Some construction and development works would occur on a 24-hr basis (e.g. ventilation shaft construction).

4.15 INTERACTION WITH DEVELOPMENT CONSENT DA 60-03-2001

The Project does not include approved underground mining operations in the Wongawilli Seam in Areas 1, 2, 3A, 3B and 3C at the Dendrobium Mine and associated surface activities (such as monitoring and remediation). These activities will continue to operate in accordance with Development Consent DA 60-03-2001 (as modified).

During the life of the Project, it is proposed that the extraction of Area 5 would be integrated with the extraction of approved Dendrobium Mine Areas 3B and 3C (Section 4.5).

There is uncertainty regarding the ability to extract the remaining resource in the approved Area 3C and the timing, that is contingent on IMC's ability to effectively drain gas from the seam to achieve levels that facilitate safe extraction of the resource.

Area 3C would be mined under Development Consent DA 60-03-2001; however, as the approved mine life of the Dendrobium Mine is 31 December 2030, the necessary extension to the operational life of the Dendrobium Mine under Development Consent DA 60-03-2001 to allow mining in the majority of Area 3C (i.e. areas where there is currently high gas content) after 31 December 2030 would be subject to a separate application for approval which is not part of this application.

If Infrastructure Approval is granted for the Project, surface facilities and underground roadways used by the Project would be operated in accordance with the conditions of the Infrastructure Approval for the Project as well as Development Consent DA 60-03-2001, until such time as Development Consent DA 60-03-2001 is modified such that activities are undertaken in accordance with the Infrastructure Approval for the Project. This would relate to:

- use of existing roadways and drifts for personnel and materials access, ventilation, dewatering and other ancillary activities related to Area 5;
- use of the existing Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Dendrobium CPP and Dendrobium Shafts, including the integrated water management system;
- transport of sized ROM coal from the Kemira Valley Coal Loading Facility to the Dendrobium CPP via the Kemira Valley Rail Line;
- delivery of product coal from the Dendrobium CPP to the Port Kembla Steelworks or PKCT for transport to Liberty Primary Steel Whyalla Steelworks or export; and
- transport of coal wash by road to customers for engineering purposes (e.g. civil construction fill), for other beneficial uses and/or for emplacement at the West Cliff Colliery Stage 3 and Stage 4 Coal Wash Emplacement Area.